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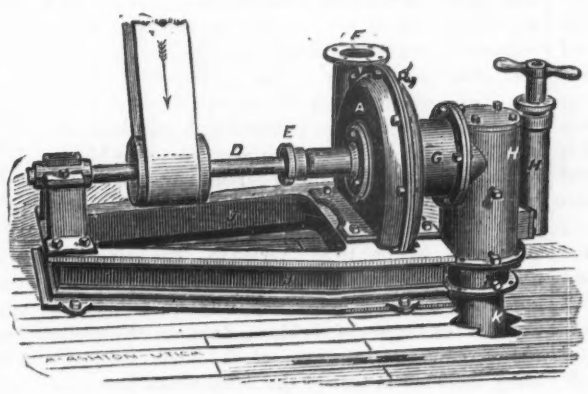
Heald and Sisco's Pump.

The use of pumps which are capable of handling great quantities of water, is doubtless destined to increase very greatly, for they are constantly finding new fields of action. One of the most sensible applications of this style of machine is that of a carrier for finely divided material and ore through short distances. In a dressing works which had to treat from 150,000 to 200,000 cubic feet of sand daily it was found that the cheapest and most convenient mode of handling it was to carry it in water, and that establishment is accordingly fitted with numerous rotary pumps; most of them having short lifts of 6 to 8 feet. Although this system increases the bulk of the material so greatly that the original 150,000 feet of the above mentioned works, is swelled to 2,000,000 cubic feet by the addition of water and the repeated handling, the method of transport by means of pumps has been found, after years of experience, to be far superior to all others.

We illustrate this week the HEALD and SISCO system of constructing rotary pumps. In the place of the usual arms and vanes they use hollow arms. The arms indeed form a hollow drum revolving within the outer case of the pump and divided into curved sections, through which the water flows. The curvature of these "hollow arms" permits the best utilization of power, and the result is that the coefficient of effect is very high.

This form of construction is perfectly adapted to raising mud, gravel, grain etc., one of the principal uses required of this form of pump. Our illustration shows the horizontal type, with the suction primer used for filling the pump before starting it. The vertical pump is in all respects similar to this. The Speedwell Iron Works, 36 Courtlandt street, New York, are agents for the sale of this pump.



HEALD AND SISCO'S PUMP.

Metallurgy, and its Relation to Other Sciences.

By ALEXANDER TRIPPEL, Metallurgist.

Metallurgy, as the art of extracting precious or other metals from ores, is of unknown origin. Eleven hundred years before our era, the Phœnicians found silver smelting works in Spain, worked extensively and prosperously, and centuries before that period, it is claimed, the Chinese knew how to make copper and zinc.

But metallurgy, as a science, originated and grew with the progress made in chemistry and physics, and it is but recently that metallurgical facts have been based upon chemical and physical principles, most of them having previously been observed and applied to our wants without the knowledge of these sciences, and hence they must rather be considered the *cause* than the *result* of many important scientific discoveries.

As a reason why the production of precious metals made such early progress, we may assume that this trade was in the hands of men who were less influenced by any theories than by one of the strongest human passions—the passion for wealth—and when any discoveries had been made by patient experimenting, they were tenaciously held until something better was found. Fortunately, their empyricism, although of great benefit in the earlier periods of metallurgy, took a turn with the steady development of chemistry and physics, and the services rendered to science by persevering experiments, were returned by a rational explanation of many observed facts and phenomena, by which metallurgy became systematized and grew to be an independent branch of scientific knowledge.

But, as generally happens, when a new light is opened to the human mind, the practical importance of chemistry in metallurgical operations was overrated; it was thought that *all* metallurgical questions were explained by and dependent upon chemistry, or that metallurgy was but a chemical laboratory on a large scale. This is decidedly an error. Not only are these operations distinguished by the scale on which they are carried out, but also by essentially different general principles and means of action. It must be admitted, too, that while many metallurgical facts are yet left unexplained by science, it would surprise our readers to know the innumerable useless experiments, which have been made on the strength of incomplete or erroneous theories, advanced by scientific men.

The metallurgist, in trying to make observations, encounters more than common difficulties. One of them is the great distance usually existing between such establishments, followed by the hesitation on the part of the owners to facilitate the task, for fear of injuring pecuniary interests; another difficulty is the want of a more intelligent and close connection with the workmen, who alone know many facts. Since labor, thanks to the enlightened ideas of modern civilization, has become ennobled, we have learnt to recognise that, as carried on in metallurgical works, it has not only its important share in the improvement of the art of producing useful metals, but in many respects has a philosophical value, inasmuch as the practical workman is the possessor of a long accumulated experience, and of facts inaccessible to the scientific man, except through him. Nevertheless, the tendency of the present is rather in favor of subordinating practical experience to theoretical knowledge, although, in many respects, the first is more necessary and valuable than the other, provided that this view is not extended to those theories which are founded upon facts, and therefore are never in opposition to practice.

I think that we, in this country, have particular reason to affirm the correctness of this remark. Millions have been spent uselessly in inventions, based upon vague theories or doubtful laboratory experiments. While fully admitting the great and most valuable assistance of chemistry, physics and mineralogy, it should not be forgotten that engineering mechanical skill and a just estimation of local circumstances, have quite as much to do with the success of a metallurgical establishment. In fact, there is no useful art where scientific knowledge, coupled with practical experience, is so essential as in metallurgy. Chemistry determines the phosphorus and sulphur in iron ore, and by the analysis we are enabled to select our fluxes; but mechanical skill teaches us how to build a proper furnace, and machinery to hammer and roll the iron into shape. The most extraordinary scientific researches on the nature and character of steel by eminent men have not influenced the manufacture of steel as much as the application of gaseous fuel and the BESSEMER or MARTIN process, not to forget the mechanical arrangements for casting large blocks solid and uniform in grain.

The separation of silver from lead by means of zinc is founded upon physical and chemical principles, but the successful application of this system is the work of close observation and mechanical skill.

And it is so with most metallurgical operations, more or less, proving conclusively that metallurgy is not merely a subordinate branch of any one of the exact sciences, but has worked itself up from empyricism, and with the aid of these sciences and mechanical art, to an independent part of human knowledge. As such, it is not only for the material benefit of mankind—as LESOINNE used to say, "the art of making money from the ore"—but it contributes a treasure of experience and facts to the student of science, and conveys views of many natural phenomena which otherwise might remain unsolved. What BERZELIUS was to modern chemistry, that was KARSTEN to modern metallurgy. By him it was first introduced to the world as a complete system of knowledge; it was through him that the character of steel became first known, that the industry of iron and zinc was planted on a large scale in Silesia; it was he who shed light on the process of amalgamation, and who first introduced the separation of silver from lead by zinc (a process to which I had occasion to refer in all its details in a publication some eighteen years ago.) While the manufacture of so many useful objects has made rapid and unprecedented progress in this country, metallurgical operations, until within a short period, have been carried on upon routine, or worse, upon confused or mistaken ideas. So long as the ironmaster contented himself with producing pig iron saleable at a profit, or the gold miner with getting so much gold from his amalgam,

as to leave a handsome return, or so long as the selected rich silver ores were profitable, by whatever process they were spoiled, all went smooth enough, and quacks were in the ascendant; but when the demands of the market for certain qualities of metal became more stringent, when complicated or poor ores had to be treated with economy, or when the difficulties surrounding a location required exceptional treatment, then metallurgical skill came into demand, and the fact proves that sound theory and practical experience must go hand in hand to produce a desired result.

I notice frequently a popular idea prevailing, that to arrive at favorable results nothing more is needed than to imitate a described treatment of ores under, perhaps, widely different circumstances. This is a great error. There is no more universality in any one metallurgical method than there is in the cure-alls of modern quacks.

A most interesting and promising branch is hydrometallurgy, or the art of extracting metals from ores by the wet way. So far, the method has been successfully applied to silver, copper, nickel and cobalt ores, and it becomes especially important for the poorer class of them where smelting would be unprofitable. The rational use of fuel is another important feature in metallurgy, which will be more and more appreciated, as the price of fuel advances. The establishment of certain principles and investigations of facts in the application of heat for metallurgical and technical purposes, has occupied the minds of eminent men, such as DULONG, PECLET, EBELMAN, SCHINZ and others for years past, and through their exertions has led to the introduction of gaseous fuel in so-called gas-furnaces, where the combustion of fuel comes nearer to its theoretical value, and by which not only enormous waste is prevented, but temperatures obtained, which before could hardly have been reached. The same principles will undoubtedly lead also to most important revolutions in the manufacture of iron in blast furnaces, where at present very much more fuel is used than theoretically can be accounted for. It is proper to allude here, too, to the great improvements made in the construction of furnaces, especially gas furnaces, and those for puddling iron.

These few points may be sufficient to show the wide range of activity for the metallurgist, and this in a country where mining industry presents an endless variety of material and circumstances taxing the scientific and practical mind alike. In a series of articles on the treatment of lead and silver ores, published in the *Mining Magazine* of 1854, I pointed out the many complicated manipulations in metallurgy, and can but repeat that a clear understanding of its principles and requirements can only promote mining industry with all its important consequences in a country like ours, whose destiny is unbounded.

Steam Hammer Foundations.

BY THOMAS GILLOTT.*

The introduction of the steam hammer, in 1843, rendered possible the production of forged masses of iron, greater than had previously been thought of; and since that period the power of this useful agent has been progressively increased to meet the requirements of modern engineering.

As might be expected in the application of new inventions, experience was in a great measure the guide as to what proportions should be given to the foundations for steam hammers of different sizes; and the various recommendations of some of the best and earlier makers indicated the want of some governing scientific principles, necessary to secure that uniformity always apparent where results are certain.

The elaborate investigations of the laws of impact by AIRY, WHEWELL, and MOSELEY, have been extensively applied to practice in the case of timber and other driven pile-foundations, so that the sustaining powers of these strutures are known with certainty; but a discussion of the principles that should guide the engineer in the design of that portion of the steam hammer not supplied by the makers of the hammer proper, has never, to the knowledge of the author, been published.

In ordinary steam hammers a mass of metal, of a certain weight, is raised to a given height, from which it falls—in some cases with the velocity due to gravity alone, and in others this velocity is accelerated by additional forces: the two classes being known as single or double acting, as the case may be. The accumulated work at the moment of impact is expended—first in the compression of the material operated upon to the extent of its own inertia and the resistance supplied by the foundation, and, secondly, in that of the anvil and subjacent foundation. In the case of a defective foundation, the block sinks; and the expense and inconvenience (often involving considerable loss) of packing it up from time to time are well known to those whose office it is to maintain steam hammers in working condition. It is the object of the investigation which follows, to show how this defect may be avoided; and it is assumed that the condition to be fulfilled by a perfect foundation is that the anvil and other portions of the hammer shall maintain a constant level when at rest. This assumption also involves another, viz,, that a certain level, immediately underneath the foundation proper, sustains no pressure (which pressure is fixed at a certain maximum) that will cause it to yield, and under which it is perfectly rigid.

In the earliest examples, the standards and cylinder were quite independent of the block and anvil; and afterwards, partly to maintain all the parts of the hammer in the same relative position, and partly to economise material by opposing the whole mass of the fixed portion to resist the impact of the moving weight, another form was introduced, in which the standards and cylinder were secured to the block; but, notwithstanding its apparent advantages, the effects of repeated blows upon the joints caused this plan to be generally abandoned for large hammers, and the primary one to be reverted to. The helve, now becoming obsolete, scarcely calls for notice; and the horizontal duplex hammer requiring no foundation to resist the impact of its blow, does not fall under consideration; and the case of the connected block being included in that of the independent one—the difference being that no side walls are required to support the framing and cylinder—the consideration of the principle of the latter will be sufficient.

The rigid level at which the foundation proper commences, being obtained, the portions to be considered are—first, the side walls; second, the bedplates to which the standards are secured; and, lastly, the block and elastic material interposed between it and the rigid level before mentioned.

Where stone is cheap, it is, no doubt, the most suitable material for the side walls; their office being to support the framing, and, by being secured to the feet of the standards, prevent lateral vibration, it is advisable to secure as much weight and as broad a base as possible; the masonry being carried up from the rigid bottom in order that the shock of the falling hammer may not be transmitted to the various connections so as to injure them. The whole weight should be made available by passing the holding-down bolts through the total depth of the masonry; making the lower ends accessible, so that the bolts can be withdrawn with little trouble when it is necessary to do so. Where stone cannot be readily obtained, Portland cement concrete blocks may be used with great advantage.

The bed-plates form a very important part of a steam hammer foundation; and the tendency of the standards (when double standard hammers are employed) to spread outwards is very great; more especially in those hammers where many side blows have to be given, as in making boiler-plate slabs or shingling, and the standards not bolted together at the bottom of the guides. It is scarcely practicable to cast bed-plates for large hammers in one piece, on account of their unwieldy size and the liability of getting broken; but each standard ought to be well bolted to its own plate, and also wedged in joggles cast on the latter; the plate being extended front and back and the holding-down bolts kept wide apart, in order to give as much lateral steadiness as possible. Where the latter point has not been attended to (and there are numerous instances) the attachment of guy rods to the upper portion of the framing has been found necessary. To connect the two bed-plates together, the author prefers two very strong wrought-iron tie rods (one on either side) with T heads, let into corresponding recesses in the plate while hot, and the standard adjusted in the joggles (before mentioned) previous to being wedged. Instances have fallen under his notice in which this form of connection has been subjected to the strains of ten years' working without visible alteration, while the more modern plan of intermediate plates bolted through flanges cast on the under side, have required renewals, sometimes of bolts and sometimes of plates, in less than one-third of that time; besides having allowed the spreading of the base to a considerable extent.

The anvil-block is the most important part of the foundation, and requires a more scientific investigation than those parts which have before been treated of, in order to determine the necessary amount of material and avoid undue waste of it. As to the mass that should be placed to resist the impact of a steam hammer, nothing, so far as the author is aware, has been published; therefore, in the following analysis of the conditions which determine it, only such steps of the demonstration are assumed for which reference can be had to known authorities. Moseley ("Mechanics," p. 591) shows that when a body of the weight W_1 moving with a velocity V_1 impinges upon another body of the weight W_2 at rest, at the instant of greatest compression both will move with a common velocity,

$$V = \frac{W_1 V_1}{W_1 + W_2}$$

which is totally independent of the nature of the bodies and their elastic properties; and (p. 597) in the impact of two elastic prisms (whose length is L, section K, and elasticity E), one of which rests against a fixed surface at one extremity, and at its opposite extremity receives the impact, in a horizontal direction of the other prism, the limits of perfect elasticity not being passed, the maximum driving pressure is represented by

$$P = V \left\{ \left(\frac{L_1}{K_1 E_1} + \frac{L_2}{K_2 E_2} \right) g \right\}^{-\frac{1}{2}} \sqrt{W}.$$

(To be continued.)

*Read at the Leeds Association of Foremen Engineers.

The Alpine *Monitor* (California) of Aug. 17 says:

For several months past the mining and milling work of Alpine has been done principally by the Schenectady and Monitor & N. W. Companies, owning on the Tarshish lode; the Globe, on the opposite mountain; the Mount Bullion, down at the river, and the Exchequer, up Scandinavian Canyon. These five enterprises have kept about one hundred and fifty men at work, about two-thirds having been in the employ of the first two mentioned. The Schenectady works promised most for the immediate prosperity of Monitor, and upon this those who lost by the fire of March 30th put in their money and credit freely to the building up of our town, and hardly finished ready for occupation their several really good buildings, when this Company shut down, and put a damper on the whole community such as has never before been experienced even in Alpine, where wet blankets have been common. On the heels of this the Globe was ordered to temporarily suspend operations until means for vigorous prosecution of work should accumulate. The Mount Bullion then shut down, and the Monitor & N. W. management fearing the depressing influence of these suspensions, knocked off largely from their force, so as to reduce current expenses to the smallest possible rate and yet keep the development of the mines—now looking more encouraging than ever before—in a forward state. Now we learn with much regret that all work at the Exchequer mine and mill, including the erection of two sets of hoisting works just ready to go up, has been suspended by reason of suits having been commenced by adverse claimants to part of the property which Mr. Chalmers the manager has obtained by purchase for his Company.

NOTES ON A METALLURGICAL JOURNEY IN EUROPE.

By JOHN A. CHURCH, E. M.

The Copper Process at Agordo.

CONTINUED FROM PAGE 132.

ROASTING OF MATTE.

Matte	1488 tons	per ton.
Charcoal	18288 bushels	12·3 bushels.
Wood	251 cords	0·15 cords.
Peat	55·4 tons	0·03 tons.
Labor	5010 days	3·15 days.

FUSION FOR BLACK COPPER.

Charge :	Roasted matte containing 23·2 per cent. copper		1343 tons.
	" " " 60.8 " " "		175 "
	Crasses and cinders		25 "
	Scoria		380 "
	Sandstone		477 "
			2399
Products :	Matte containing	60·26 per cent. copper	191·6 tons.
	Black copper containing	90 " " "	314·4 "
	Crasse	15 " " "	20·3 "
	Cinders	10 " " "	12·8 "
			539·1
Labor :	747 shifts, 4 men to each shift		2988 days.
Fuel :	Charcoal		88,047 bushels.
Labor :	per ton of charge		1·24 days.
Charcoal :	" " "		37 bushels.
Charge smelted in 24 hours			9·5 tons.
Loss :	The charge contained of copper		869,411 pounds.
	The products " "		837,016 "
	Loss therefore		32,395 pounds.
	Or		3·7 per cent.

FINING.

Charge :	Black copper		628,443 pounds.
Product :	Rosette "		492,840 "
	Crasses and cinders		96,228 "
Labor :			1,296 days.
Fuel :	Charcoal		24,000 bushels.
Loss :	Copper in materials charged		597,025 pounds.
	" " obtained		589,068 "
	Loss therefore		7,957 "
	Or		1·33 per cent.

TABLE OF LOSS.

	Copper in charge.	Copper in products.	Loss.	Per Cent.
Lixiviation	418,895 pounds.	232,606 pounds.	186,289	44·5
First fusion	641,641 "	603,742 "	37,899	5.9
Second fusion	869,400 "	837,016 "	32,384	3·7
Fining	597,025 "	589,068 "	7,957	1·33
	2,526,961	2,262,432	264,529	

This amounts to a loss of 34·42 per cent of the copper in the ores. But this is too high, because all the products from the piles and the cementation vats were not smelted within the year. Knowing the percentage of loss on each operation we can calculate the true loss on 20,466 tons of ore containing 388·7 tons copper as follows :

Lixiviation loss on	418,800 lbs. copper	@	44·5 per cent.	=	186,366 pounds.
First fusion " "	590,834 " "	@	5·9 " "	=	34,859 "
Second fusion loss on	555,975 " "	@	3·7 " "	=	20,571 "
Fining " "	535,404 " "	@	1·33 " "	=	7,139 "
Total	777,400 lbs.		32·0 per cent.		248,935 lbs.

Engineer PELLATI reports the loss for 1865 at 31·8 per cent.

From this it appears that roasting and its accompanying lixiviation are the processes which cause the greatest loss, and are, therefore, the least perfect.

Expense per ton. To ascertain the average cost of one ton of pyrites, we will take the following amounts. Best ore 406,547 k., kernels 2,081,447, shells 16,060,785 k. ; total 18,548,779 kilos or 20,399 tons. The expenses of labor and material upon each ton of this, in all the operations, is as follows :

TABLE OF EXPENSE FOR 2000 POUNDS ORE IN UNITS OF LABOR AND MATERIAL.

	Labor days.	Wood Cords.	Charcoal bushels.	Peat tons.	Iron pounds.	Sand stone tons.
Roasting ore	1·93	0·003	.....	.....	.....	.....
Lixiviation	0·07	.....	.....	.....	.....	.....
Cementation	0·12	.....	0·034	0·042	31·41	.....
Fusion for matte	0·17	.....	5·160	.....	.....	0·028
Roasting of matte	0.25	0.012	0.900	0·002	.....	.....
Fusion for Black Copper	0·15	.....	4·310	.....	.....	0·023
Fining	0·06	.....	1·18	.....	.....	.....
	2·75	0·015	11,584	0·044	31·41	0·051

Prices at Agordo are as follows :

Mining ore	9·55 francs per ton		
Charcoal	12·25 "	per cubic meter =	8·5 cents per bushel.
Wood	3·00 "	" " " =	$2·13 per cord.
Peat	3·00 "	" " " =	$15·00 per ton.
Iron	150·00 "	" 1000 k. =	$27·26 per ton.
Labor	1·00 "	" day (average) =	20 cents a day.
Sandstone	7·50 "	" 1000 k. =	$1·36 a ton.

From the above table of loss it is apparent that the old process in use at these works was a very expensive one, considered in regard to extraction. The loss in lixiviation was enormous, and improvement in that part of the process would evidently afford the best reward. But this truth was not immediately perceived ; a number of minor matters first received attention, and the changes introduced were not always useful.

Improvement at Agordo first took the direction of attempts to increase the amount of sulphur extracted ; and to concentrate the copper more perfectly in the kernel. Although the ore contains 50 per cent., or more, of sulphur, the piles save at most one half per cent. To increase the yield the "Styrian Kiln" was adopted. This is merely a rectangle, enclosed by walls and paved with stone. In the walls, which are very thick, there are a number of chambers, communicating with the interior, by small passages. The ore is filled in and covered with fine ore, and fine spent ore from the lixiviation vats is stamped on the top for a cover. The ore is ignited by a canal in the bottom of the kiln, and the roasting goes on precisely as in a pile ; but the products of combustion are discharged through the side passages. As the sulphur vapors are longer in passing out, and the masonry in which they circulate is exposed to the air, they are more thoroughly cooled and condensed. At the same time the thick walls serve to retain the heat of the mass, which reaches a temperature, probably considerably higher than that of the pile. The result of these conditions is, that nearly one-half more sulphur is condensed, and the higher heat produces better kernels. Indeed, poor ore, that gives no kernels, when roasted in piles, yields them in the kilns. The experiment was therefore a success, in having fulfilled the expectations formed of it. But this was the turning point in Agordo improvement. The high heat which made the kernels so fine, also caused the destruction of the copper sulphates, in the shells ; the sulphuric acid was driven off, and cupric oxide left. This is insoluble in water, and caused a great increase of the loss in the process of lixiviation, a loss which, as we have already seen, reached 44·5 per cent of the copper treated. The sulphur at Agordo is always contaminated with arsenic, and its use is restricted. Its price is therefore low, and its production unimportant. These considerations led at once to the disuse of the Styrian kiln, (5) and improvement took its true direction in efforts to increase the yield of copper and lessen the expense of operations subsequent to the roasting. Great results have been attained in this work. They are—1st. The almost complete extraction of the copper by roasting and lixiviation ; 2d. Projected improvements in cementation, which include the disuse of all operations but Roasting, Lixiviation, Fining and Crystalization.

Improvements in Roasting—One of the peculiarities of the Agordo deposit is a layer of hygroscopic pyrites, which falls to pieces upon contact with the air. This is made into round, conical bricks, which are dried and then piled like the other ore. But to save the expense of ovens, which are necessary in the winter, the extraction of this ore has been confined to the summer season. It is now proposed to build crushing works, and break up all the ore, except the richest, to the size of one centimeter (0·4 inch). It will then be stamped into bricks. These have the shape of a truncated cone, with a height of 10 centimeters (4 inches), and a mean diameter of 15 centimeters (6 inches.) Three moulds are cast in one piece, and a workman can make 600 bricks by four o'clock P. M., his work being as follows : bringing and wetting his ore with mother liquor from the crystalization vats ; forming the bricks, and carrying them to the drying ground. It should be remarked in regard to the time, that the workmen at Agordo are compelled to leave work at 4 P. M., because of the sulphurous acid vapors from the roasting piles, near which they work. There is nothing in the work itself which forbids a full day's labor, and a production of at least one-sixth more. The bricks weigh about 2 k. or 4·5 pounds each. They are air dried, and then piled on the outside of roasting piles in full operation, and completely dried. The weak solution of iron and zinc sulphates, which forms the spent liquor from the crystalization vats, acts with a slight oxidizing effect upon the grains of pyrites, and binds them together like a cement ; the bricks are consequently quite hard.

After drying they are piled in regular order, 70,000 or 80,000 in a pile ; covered with small ore, and lighted as usual with logs of wood placed at the corners. When fully ignited a layer of spent roasted ore from the lixiviation vats is thrown over the pile to serve as a cover. The roasting period is, as usual, 7—9 months, according to the size of the pile. This is then opened, and each brick is broken in two to ascertain whether it is fully roasted. Those which are underburned are thrown into a pile of fresh bricks and reroasted. It is the peculiarity of this method that no brick is ever *over*-roasted, a fact that is fully proved by fifteen years' uniform experience.

A perfect roasting, for purposes of lixiviation with water, is that which leaves the greatest possible amount of sulphates. How much superior this roasting of the ore in brick form is over that in lumps, is shown by the following results communicated by Signor de HUBERT :

Fine ore, stamped in moulds, roasts to a red-brown color and loses in lixiviation	30	@ 32	per cent.
Ore in lumps, well roasted, but of a darker color, loses	18	@ 25	" "
The same, over-roasted, nearly black in color, loses		14	" "

Thus we see that the gain by crushing and moulding the ore is twofold. Over-roasting is steadily avoided, and the roasting is better than the best in any other form.

This gain in soluble matter is of course principally iron sulphate, but it is a well-known fact that copper sulphate is much less easily decomposed by heat than

5. One of these kilns is still in use, but only for want of room for the roasting piles.

iron sulphate, and we ought therefore to expect an increase in the proportionate extraction of copper, even greater than that of the iron salt. If we take the average extraction of iron sulphate, from the lump ore, to be 22 per cent., and from the brisk ore 31 per cent., the latter gives about 33 per cent. greater yield of this salt than the former. We have seen that the loss of copper in roasting and lixiviation is estimated at no less than 44·5 per cent., while experiments on the new method indicate a loss of only 3 or 5 per cent., which is a gain in extraction of 75 per cent. These results are astonishing, and simple as the means taken to produce them are, must be underlaid by some general principles of value.

Were the molecules of which each lump of ore is composed independent of each other, we should probably have an almost complete conversion of the sulphide into sulphate in roasting, as the heat produced by the combustion of one extra atom of sulphur does not seem sufficient to destroy the sulphate salt formed by the burning of the other. When this destruction does take place, it is probably due to the fact that the particles of ore do not all reach the sulphate stage at the same moment, and those that arrive there first are subjected not only to the effects of the heat stored up in them by the combustion of their sulphur, but also to the added heat which the neighboring particles of sulphide give out in burning. Among the remedies, which have been proposed for this evil, is the admixture of inert substances to keep the particles of roasting matter apart. The improvement at Agordo may properly be ploced in this class, though the substance mixed in with the ore is not a solid, but a gas; it is air. But the air performs the functions of an inert non-conductor, and it is to this property that it owes its value.

The reason why the bricks roast better than the lumps is doubtless to be found in the difference in the physical condition of the ore, produced by crushing, or by the natural disintegration of the hygroscopic ore. The superiority of the small ore is in the severance of the mathematical contact naturally existing between ore particles, in large lumps. That it plays an important part is proved by the fact, that no kernels are ever found in the bricks formed of small ore, the concentration of copper in the centre being prevented by the separation of the lump into an infinite number of small grains, which have no perfect contact. In the kernel roasting, for which this place has been so famous, it has been observed that the copper in one lump has sometimes been concentrated in a neighboring lump, lower in the pile, with which it came in contact. For the transmission of copper from one lump to another by any process yet suggested, an absolutely mathematical contact is indispensable. Whatever the true method of that transmission may be, it is evident that an action, so exceedingly slow and delicate as it must be, could not proceed if the least chasm or other obstruction lay in the way of the advancing copper. There must have been a mathematical contact between the two lumps of ore, and it remains to explain why two neighboring grains in a brick cannot come into equally intimate union.

The explanation given at Agordo for the transfer of copper from one ore mass to another, is that, in a pile made up of irregular lumps, there will be irregularity of interstices also, and some of the open spaces will be so large as to furnish air enough to cause too rapid combustion in the pieces immediately around them. The heat being thus raised, the mass of pyrites melts superficially, and flows down upon the lump below, thus establishing the close contact necessary for the transmission of the copper, in its process of concentration.

In the brick made up of grains, none of which are larger than 1-16 cubic inch and most are from 1-4 to 1-10 inch in diameter, this rapid fusion cannot proceed. Even if one particle gets into furious combustion, the air which almost surrounds it prevents the transmission of its heat and there is no general fusion of the surface of the brick. Thus the air maintains the disaggregation of the pile.

Admixture of an inert solid, like silica or shale, serves the same purpose as air. The poor ore at Agordo rarely has kernels, or only inferior ones. The interposition of the silica prevents the advance of the copper; and when kernels are formed it cannot be doubted that the gangue, always small in quantity, is absent, or nearly so, from those pieces which give the kernel. Thus we may refer the slow and even roasting of the bricks to the separation of the ore particles which is accomplished by crushing; while the maintenance of this separation is due to the non-conductor—air—by which they are nearly surrounded.

These facts may be observed daily at Agordo. The piles made up ore bricks are much less aggregated by fusion than the others. Ordinary piles are found to consist, after burning, of a mass which has gained decided coherence by the heat it has undergone. The ore must be knocked out by strong blows of a hammer; while the bricks, though somewhat coherent, yield much more readily.

It is proposed to take advantage of these results of many years experience and erect (1) Crushing works in which whatever crusher is selected will have to exert both a crushing and a percussive action, as the Agordo ore is very hard and tough; (2) Ovens for drying the ore. (The order for these had been received in 1869.) In addition to this, there will probably be some changes in manipulation, as at the lixiviation tanks where the ore is now moved twice, instead of pumping the liquor, a much less laborious operation; but of this kind of improvement which is merely the reforming of a bad disposition of the works, and includes no principle, I do not intend to speak.

The next field in which improvement is to enter is the precipitation of the copper by iron. Three propositions are now before the government, as follows. 1. Hot precipitation in revolving casks, 12 feet in diameter, as at Skofie in Austria. This operation is thus shortened to 12 hours, no basic salts are produced, little arsenical salt precipitated and the amount of iron used is practically a *minimum*; 90 iron to 100 cement copper or 154 iron to 100 pig copper. It is difficult to institute a fair comparison between the Skofie method and that at Agordo, though the ores have about the same value, because the ore of the former is already an oxide; but leaving out the roasting in both cases, the following comparison of loss and expense of material, in other operations, gives a good idea of the decided differences in the two systems.

To produce 1000 k. (2200 pounds) rosette copper, requires at

	Agordo.	Skofie.
Copper in the ore	1412 kilos.	1202 kilos.
Wood	1·90 cubic meters.	
Peat	19·10 " "	
Charcoal	34·40 " " "	2·1 m.
Iron	2750·00 kilos.	1540 kilos.
Sandstone	4460·00 "	1540

This comparison is the more striking when we remember the fact that only 46 per cent. of the copper which was smelted at Agordo had passed through cementation. The rest was obtained from kernels and rich ores.

2. Addition of sulphuric acid to the liquor during cementation. This is the suggestion of Signor DE HUBERT, director of the smelting works, who has worked out the method. The greatest defect of the present system of precipitation is the production of basic salts of iron. These are the result of the long contact of the hot liquor with the pig iron in the tanks and they cause a loss of iron, a precipitation of arsenical salts, and by adulterating the cement obtained, they prevent the immediate conversion of the cement to pig copper, and thus cause a loss of 9 per cent. of the copper in the cement, by the double fusion which is necessary. Signor DE HUBERT finds that these inconveniences can be avoided by the addition of sulphuric acid to the cement liquor, a course which carries with it only two objections; the cost of the acid and the use of more iron; while its advantages are the production of a cement which can be smelted at one operation to fine copper; and a larger make of copperas. The latter, it is true, arises partly from the sulphuric acid added and the extra amount of iron consumed; but also, from the prevention of the basic salts.

Experiments in the laboratory gave the following results:

Without sulphuric acid, the cement contained 1—3 per cent. of arsenic and 30 per cent. of copper, the impurity being chiefly basic iron sulphate.

With sulphuric acid the cement contained no arsenic, no basic salt, and 67—73 per cent. of copper; the impurities being carbon from the iron, iron powder, ore particles and sulphur. The latter was in so small quantity that the cement was well adapted for immediate fining.

An experiment in the large way resulted as follows:

Amount of cement liquor (charge for one vat) 16·75 cubic meters.
Concentrated acid 1·25 litres (4 lbs.)
Iron consumed to 100 copper 232·00
Cement contained copper 75·3 per cent.
Arsenic none.

The importance of avoiding the formation of basic salts is seen from the fac that of the cement obtained in 1865:

375,800 pounds contained only 58·57 per cent. copper = 220,106
51,790 " " " 9·89 " " " = 5,122

Total copper.....pounds....225,228

Allowing 33 per cent. for impurities by the proposed method (see experiment in the large way) the production of cement to yield this amount of copper would be 297,007 pounds. As the amount by the old method was 427,590 pounds, we may look upon the difference, or 130,583 pounds as the amount of the basic salts. These salts have the following compositior

Sulphuric acid	35·35	
Ferric oxide	43·21	Iron 30·24
Alumina	15·71	
Zinc oxide	5·53	
	96·80	

In addition to this they contain a variable quantity of water.

The enormous consumption of iron, two and three quarter pounds, for every pound of copper precipitated, in 1865, is, therefore, partly due to the formation of these insoluble salts; for they are formed by the union of a certain quantity of the soluble sulphates with the iron introduced into the vat. But the amount of iron thus taken up is only a little less than 22 parts for every 100 of basic salt, or about 29,000 pounds of iron thus wasted in that year. This does not by any means account for the quantity of iron nsed. But an analysis of the liquor obtained from Agordo ore, shaws that it contained an average of one-half per cent. of sulphuric acid. As there were 345,087 cubic feet of liquor, the amount of free acid was 108,340 pounds. The statement for 1865 would therefore be as follows:

Necessary to precipitate the copper	195,610	pounds iron.
Taken up by basic salts	28,601	"
" " free sulphuric acid	72,226	"
	296,437	
Amount of iron used	640,800	
Amount not accounted for	344,363	

Thus we are unable to trace more than half of the iron which is consumed. If we allow 6 per cent. for carbon and other impurities in the iron, and an equal amount for the iron sand always found in the cement, we should have a further deduction of 41,324 pounds. It may be that ore roasted in the lump contains more free acid than that roasted in bricks, which was used in obtaining the liquor analysed. It is a little remarkable, however, that the formation of iron salts in a liquor which contains one-half per cent. or more of free sulphuric acid can be prevented by the addition of so infinitesimal amount of free acid as 1¼ liters to 16¾ cubic meters; equal to 16,750 liters of liquor.

[TO BE CONTINUED.]

THE COAL TRADE.

NEW YORK, August 30, 1872.

Anthracite Coal.

Prices at the Scranton sale were as follows:

	August.	July.	Decline.
Lump	$3 17½	$3 22½	5c
Steamer	3 20	3 26½	6½
Grate	3 40	3 42½	2½
Egg	3 44	3 49	5
Stove	3 77½	3 86	8½
Chestnut	3 24½	3 44½	20

The Wilkesbarre Company has put down its prices as follows:

		Decline.
Lump	$3 60	15c.
Steamer	3 65	10
Broken	3 85	—
Egg	3 85	—
Stove	4 10	15
Chestnut	3 60	20

Lehigh continues in fair demand in spite of the rise of 10 cents a ton, which other coals do not seem able to imitate. Otherwise "no change" is still the index of the market. The demand for steam coals of course continues.

The long talked of scheme to control prices by means of a pool has at length found partial adoption. Most of the Schuylkill operators, including all those whose interests are united with the Reading railroad, and many outside of that influence, have united in an agreement to fix a *minimum* price for coal each month. A committee of five, which will be appointed by the Anthracite Board of Trade, are to fix the *minimum* price on the day following the Scranton sale. Some other alterations in the mode of doing business have also been agreed upon. Thus prices will hereafter be nett, the two per cent. discount formerly allowed being done away with. Retail dealers are not to be allowed to refuse coal that has been ordered.

There is considerable unanimity in the Schuylkill region in regard to this measure, and as before said, a majority, considered both in regard to the number of dealers, and to the quantity of production, have signed the league. There does not, however, appear to be any expectation among dealers of decided consequences from the movement. There will always be producers whose circumstances permit them to keep aloof from these agreements and hitherto they have never failed, either by positive action against, or steady failure to work with the leagues, to break them up. Schuylkill is not in a position to dictate terms, except to those customers who are necessarily dependent upon it for their coal. Beyond a radius fixed by the rates of transport, the other great coal districts enter upon the scene as competitors, with whom it is hopeless to try compromises. It must necessarily follow the rates of the Scranton sales, and though in some quarters there appears to be an impression that the new move will help the suffering mine owners, we cannot see how the Schuylkill people can force prices, except to their neighbors, in the face of great and active competitors and an inordinate production. The lesser provisions of the agreement may be of much greater value to the Trade than fixing the *minimum*. The correspondent of the Philadelphia *Evening Bulletin* says that "it will do away with the middlemen, who stand between the producer and the customer, and whose commission of twenty-five cents a ton must be paid whether the operator makes anything or not. Fifteen cents a ton will be saved in this item alone, and fifteen cents a ton is a broader margin than many collieries have been operating on for the last five years or more." But we cannot agree in the happy vista he paints when he says that "Each colliery will also find as good a market for its coal as will the others, and there will be no losses of payments when they are guaranteed by the Reading Company. Operators can work in harmony, and any strikes on the part of the miners, no matter how widespread they may be, will be suppressed by the simple refusal of the agent to sell coal until required to do so by a majority of the operators; thus rendering harmless the few mischievous spirits who are always ready to take advantage of their neighbor's misfortune, and make hay while the sun shines in their little patches exclusively."

The committee who are to fix the minimum rate meet to-day. The Philadelphia correspondent of one of our principal dealers thought the new prices would be about $2,50 for Lump, Steamer, Broken and Egg, $2,75 for Stove $1,75 for Chestnut and $1,25 for Pea; all at Port Carbon, and all nett.

AUGUST 31, 1872.

The Pottsville Combination yesterday fixed the price of Schuylkill coal, at Port Carbon, for September, as follows: Lump, Steamer and Broken $2,50; Egg and Stove $2,65; Chestnut $1,75 and Pea $1,00, all nett. Last month the prices were for Lump, Steamer, Broken and Egg $2,25; Stove $2,50. On tolls on Schuylkill Canal from Schuylkill Haven to New York, there will be for September a decline of six cents on Lump, Steamer and Broken, and an advance of 14 cents on Egg, Stove and Chestnut. The rates to Richmond on Egg, Stove and Chestnut will have an advance of 19 cents; other sizes are no change.

The Bituminous Trade.

Trade continues as it has been. Cumberland coal is in good demand, though the inquiry on English account has not yet resulted in contracts. The agents are however still in the market. Otherwise trade in general is as it has stood so long.

Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending August 24, 1872, compared with the week ending August 26, 1871.

COMPANIES.	1871. WEEK.	1871. TOTAL.	1872. WEEK.	1872. TOTAL.
*Phila & Reading R. R†	150,902	3,289,776	123,691	3,612,178
Schuylkill Canal	33,340	587,481	15,978	518,655
*Lehigh Valley R. R.	70,993	1,249,876	55,627	2,205,764
Lehigh & Sus. R. R.	35,963	721,553	36,516	1,114,002
Lehigh Canal	32,106	334,965	25,610	459,273
Scranton North	22,439	251,171	16,157	455,527
" South	42,332	579,194	40,960	1,389,311
Penn. Coal Co., rail	26,532	352,272	20,790	757,557
" " canal	1,082	7,709	238	3,594
Del. & Hud. Canal Co.	44,109	510,757	36,400	856,650
" " East	7,896	177,040	10,713	391,139
" " West	4,721	56,304	9,167	248,735
" " South	10,529	166,014	8,934	240,201
Shamokin	13,123	415,948	12,389	350,380
Trevorton	....	.....	....	....
Lykens Valley Coal Co.	2,255	59,047	..	2,065
Wyoming North	....	.....	....	....
Wyoming South	....	.....	....	....
P. N. Y. C. & R. R. Co.	....	104,987	10,718	426,641
Williamstown Col'y	....	.....	....	....
Big Lick Col	4,371	91,861	....	10,591
Total	502,713	8,955,875	424,128	13,043,460
1870	424,128			8,955,875
Increase				4,087,585
Decrease	78,585			

* These figures are for the week and fiscal period commencing Nov. 30.

† Less coal transported for Co's use and Bituminous coal.

Bituminous Coal Trade, 1871 and 1872.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending August 24, 1872, compared with week ending Aug. 26, 1871.

COMPANIES.	1871. Week.	1871. Year.	1872. Week.	1872. Year.
C. & O. Canal	13,631	424,649	15,306	403,759
B. & O. R. R.	26,630	805,027	26,840	808,813
H. & B. T. R. R.	3,520	220,307	6,566	192,930
*Harrisburg & D.	7,595	369,258	8,327	330,971
*L. V. R. R.	7,876	262,677	398	19,897
P. & N.Y.C. & R. Co.	....	.....	6,562	249,974
Cumberl'd Branch Canal	5,580	124,921	6,166	136,088
" Railroad	914	47,865	....	11,599
Total	65,746	2,254,704	70,165	2,153,031
	....	2,153,031	65,746	
Decrease	....	101,673		
Increase			4,419	

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, August 24, 1872.

	WEEK.	SEASON.
North	52,914 12	1,656,356 03
South	8,933 17	240,200 11
Total 1872	61,848 09	1,896,556 14
Corresponding time in 1871:		
North	58,420 19	721,517 01
South	10,529 02	166,014 04
Total	68,950 01	887,531 05
Increase North		
Decrease North		
Increase South		
Decrease South		
Total increase 1872		1,009,025 09
Total decrease 1872	7,101 12	

Delaware and Hudson Canal Company.

The following is a statement of Coal Transported by the Delaware and Hudson Canal Co. for the week ending Aug. 24, 1872.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,	36,400	856,650
By Railroad, East	10,713	391,139
" " West	9,167	248,735
" " South	8,934	240,201
Total Tons	65,214	1,736,725
For the same period last year.		
	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,	44,109	510,757
By Railroad, East,	7,896	177,040
" " West	4,721	56,304
" " South	10,529	166,014
Total Tons	67,255	910,115
Increase	826,610	

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, August 24, 1872.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	16,157 06	455,527 09
Shipped South	40,859 13	1,389,311 04
Total	57,116 19	1,844,838 13
For the Corresponding time last Year:		
Shipped North	22,438 16	251,171 10
Shipped South	42,351 11	579,184 07
Total	64,790 07	830,355 17
Increase		1,014,482 16
Decrease	7,673 08	

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, Aug. 24, 1872.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons. Cwt.
From St. Clair	33,868 16
" Port Carbon	5,747 05
" Pottsville	3,721 09
" Schuylkill Haven	27,406 10
" Pine Grove	3,884 07
" Tamaqua	12,054 08
" Harrisburg	6,486 03
" Dauphin	
Total	93,178 13

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	9,194 19
" Mill Creek "	2,112 00
" Schuylkill Valley Scales	75 18
" Mt. Carbon "	1,159 08
" Cressona "	4,791 05
" Pine Grove "	
" Tamaqua "	1,139 09
Total	18,472 19

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	1,896 05
" Shamokin	4,051 14
" Herndon	.....
Total	5,947 19

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	781 06
" Lebanon & Pine Grove Branch	708 06
Total	1,489 12

CONSUMED ON LATERALS.

From Frackville Scales	603 06
" Mill Creek "	517 11
" Schuylkill Valley Scales	388 18
" Mt. Carbon "	817 13
" Cressona "	177 04
" Pine Grove "	71 05
" Tamaqua "	278 00
Total	2,883 15

LEHIGH AND WYOMING COAL.

Received via Allentown, E. Penn's Br.	71 08
" " Alburtis, "	16 10
" " Oreland, G. & N. Br.	1,028 17
" " Connecting R. R.	.....
" " Willow Street R. R.	601 17
Total	1,718 12

BITUMINOUS.

From Harrisburg	8,307 00
" Connecting R. R., G. & N. Br.	
" Junction R. R.	20 00
Total	8,327 00

COAL FOR COMPANY'S USE.

Anthracite	4,631 09
Bituminous	.....
Total	4,631 09

RECAPITULATION.

	Total for Week.	Corresp'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val. Branch	93,178 13	109,116 16	d 15,938 03
For Shipment by Canal	18,472 19	29,188 16	d 10,715 17
Shipped Westward via Northern Central R. R.	5,947 19	5,304 17	i 643 02
Shipped West or South from Pine Grove	1,489 12	2,651 03	d 1,161 11
Consumed on Laterals	2,883 15	3,131 07	d 247 12
Lehigh and Wyoming Coal	1,718 12	1,508 14	i 209 18
Total Anthracite paying freig't	123 691 10	150,901 13	d 27,477 14
Bituminous	8,327 00	7,594 11	i 732 09
Total of all kinds paying freig't	132,018 10	158,496 04	d 26,477 14
Coal for Company's use	4,631 09	5,089 15	d 458 06
Total Tonnage for Week	136,649 19	163,585 19	d 26,936 00
Previously this year	4011311 08	3652380 18	i 358,930 10
Total to date	4147961 07	3815965 17	i 331,994 10

SHIPPED BY CANAL.

From Schuylkill Haven	15,278 00	27,948 00	d 12,670 00
" Port Clinton	700 00	2,640 00	d 1,940 00
Total Tonnage per Week	15,978 00	30,588 00	d 14,610 00
Previously this year	502,655 05	567,224 18	d 64,569 13
Total to date	518,633 05	597,812 18	d 79,179 13

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, August 24, 1872.

	Tons. Cwt.
From Schuylkill Haven	15,278 00
" Port Clinton	700 00
Total for week	15,978 00
Previously this year	502,655 05
Total	518,633 05
To same time last year	567,481 08

Lehigh Canal Coal Trade.

Shipped for the week ending August 23, 1872.

	Week. Tons. Cwt.	Week. Tons. Cwt.
Total from Mauch Chunk Region	8,141 12	151,749 08
" " Beaver Meadow "	4,317 08	93,415 03
" " Mahanoy "	671 08	7,579 12
" " Hazleton "	7,976 15	147,340 04
" " Upper Lehigh "	751 03	17,665 09
" " Wyoming "	3,753 03	41,522 14
Total	25,610 09	459,272 10
Corresponding week last year	32,105 18	334,964 19
Increase		124,307 11
Decrease	6,495 09	

Shamokin Coal Trade.

For week ending August 24, 1872	12,389
Same time last year	13,123 02
Increase	
Decrease	734 07
Total amount shipped to date	370,379 15
Same time last year	415,948 00
Increase	
Decrease	65,568

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending August 24—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1872., tons ct.	WEEK 1871., tons ct.	YEAR 1872 tons cwt.	YEAR 1871. tons.cwt.
Wyoming Region	33960 04	37056 02	938603 18	753298 03
Upper Lehigh Region	4319 19	4118 11	128232 01	39384 10
Beaver Meadow Region				
Hazleton Region	8046 01	10324 05	154182 09	75553 10
Mahanoy Region				
Tresckow Region	3796 02	2655 10	96079 05	26813 02
Mauch Chunk Region	9841 17	6420 18	283719 16	115686 08
Totals	59954 03	60575 06	1600817 09	1010930 13
Increase			589886 16	
Decrease	621 03			
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	36555 13	35962 18	1114001 14	721553 06
Forwarded East of Mch Chunk by Canal	15882 19	18714 12	795321 00	192760 18
Delivered at and above Mauch Chunk	1770 18	1204 07	37923 11	37074 13
L. V. R. R at Packer'n	391 04	572 05	9595 07	22446 04
Delivered to L. & B. R. R.at Plymouth Bridge	5353 09	4121 04	143975 17	47095 12
Totals				
Of the above there was transported on acc'nt of L. C. & N. Co	15695 02	19205 14	407346 13	161138 11
W.-B. C. & I. Co	21568 00	23440 05	643323 18	539998 18
Totals	37173 02	33645 14	1050670 17	701137 09
Increase	3527 08		349533 08	
Decrease				

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending August 24, 1872, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	8,701 10	378,137 19
" Hazleton	46,553 19	1,579,709 14
" Upper Lehigh	139 14	1,859 06
" Beaver Meadow	14,916 19	567,987 09
" Mahanoy	6,679 01	282,194 00
" Mauch Chunk	32 18	2,243 17
Total	77,034 01	2,782,192 05
Same time last year	96,149 12	1,533,777 10
Increase		1,248,414 15
Decrease	19,115 11	
Forwarded East from Mauch Chunk by rail	58 627 10	2,205,763 13
Same time last year	70,993 10	1,149,876 06
Increase		955,887 07
Decrease	15,366 00	
DISTRIBUTED AS FOLLOWS.		
Forwarded East from Mauch Chunk by rail	55,368 10	2,171,360 06
do East for use L. V. R. R	259 00	34,373 07
Delivered at and above Mauch Chunk for use of L. V. R. R	1.007 05	42,367 14
To P. & N. Y. R. R	6,845 17	255,289 08
To N. C. R. R., at Mount Carmel		1,952 05
To D. H & W. R. R	581 00	18,903 10
To L. & S. R. R. at Packerton for rail	265 17	9,342 17
Delivered at M'h Chunk	16 13	1,242 09
Delivered on line of road above Mauch Chunk	193 03	11,576 11
To L. S. & R. R., at Penn Hav., for railroad	51 02	4,001 09
Do. for canal	7,976 15	147,896 11
To Lehigh Canal Mauch Chunk	3,919 03	76,572 05
To Catawissa Railroad	549 16	8,353 13
Total	77,034 01	2,782,192 05

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending August 24, 1872.

	Week. Tons.	Cwt.	Total. Tons.	Cwt.
Anthracite received:				
From Lehigh Valley R. R.	6,836 03		255,279 14	
" Lack. & B. R. R.	1,109 10		56,981 16	
" Pleasant Valley R. R.	1,897 05		71,182 09	
" Sul. & Erie R. R.	874 14		37,197 05	
Total	10,717 12		420,641 04	
Distributed:				
To Lehigh Valley R. R.			30,535 02	
To Lack. & B. R. R.			1,017 17	
To S. Central R. R.	1,584 17		77,138 03	
To Ithaca & A. R. R.	2,302 07		71,362 05	
To Erie R. W. Pockets for shipm't.	5,485 04		184 405 11	
To individuals on line of road	245 17		14,103 18	
To points at & above Coxton for use of Co	563 18		17,124 18	
To points between Waverley and Elmira	535 09		24,592 10	
Total	10,717 12		420,641 04	
Bituminous received from BARCLAY R. R.				
Shipped north from Towanda	6,544 05		246,913 11	
Shipped south from Towanda	17 16		1,889 12	
Northern Central R R.			170 10	
Total	6,562 01		248,973 13	
Distributed:				
To Erie Railway	5,511 00		222,201 08	
To So. Central R. R	1,033 05		24,524 18	
To Ithaca Valley R. R.			57 05	
Lehigh Valley, R. R.	17 16		1,138 03	
To individuals on line of Railroad			849 01	
To points on line of road for use of Company			202 15	
Total	6,562 01		248,973 13	
Grand totals transported:				
Anthracite	10,717 12		420,641 04	
Bituminous	6,562 01		248,973 13	
Total	17,279 13		669,614 17	

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending August 24, 1872.

	1872. WEEK.	1872. YEAR.	1871. WEEK.	1871. YEAR.
By Railway	20,790 05	757,557 02	26,532 00	352,201 15
" Canal	238 04	3,593 15	1,082 01	7,708 15
Total	21,028 09	761,150 17	27,614 01	359,910 10
Increase 1872.		401,240 07		

Lehigh Coal and Navigation Company.

Report of Coal transported over the Lehigh Canal and L. & S. Div of Central Railroad of New Jersey for the week ending Aug. 24, 1872, and for the year 1872.

	WEEK.	YEAR.
Forwarded East of M'ch Chunk by Rail	36,555 13	1,114,001 14
Delivered at and above do., ...	1,770 18	37,923 11
Forwarded East of do., by Canal	25,610 09	459,272 10
	63,937 00	1,611,197 15
Corresponding period last year—		
Forwarded East of M. Chunk by Rail..	35 962 18	721,553 06
Delivered at and above do., ..	1,204 07	37,074 13
Forwarded East of do., by Canal	32,105 18	334,964 19
	69,273 03	1,093,592 18
Increase on Railroad	1,159 06	393,297 06
Decrease " "	.....	
Increase on Canal	6,495 09	124,307 11
Decrease " "		
Of the above there was transported on account of—		
Lehigh Coal Nav. Co	23,746 14	559,096 07
Wilkesbarre Coal & Iron Co	21,568 00	643,323 18
	45,314 14	1,202,420 05
Corresponding period last year—		
Lehigh Coal & Nav. Co	20,893 01	299,804 00
Wilkesbarre Coal & Iron Co	23,440 00	539 998 18
	44,333 01	839,802 18
Increase	981 13	362,617 07
Decrease	.....	

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday August 24, and during the year 1872, compared with the corresponding period of 1871.

WEEK.

	To C. & O. Canal Tons. Cwt.	To B. & O. R.R. C. Tons. Cwt	Total. Tons Cwt.
1872	15,305 12	26,840 04	42,145 16
1871	13,630 16	26,630 08	40,261 04
Increase	1,674 16	209 16	1,884 12
Decrease			

YEAR.

1872	403,759 10	808,813 05	1,212,572 15
1871	424 649 07	805.027 05	1,229,676 12
Increase	.....	3,786 00	
Decrease	20,889 17		17,103 17

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To P. & O. R. R. Co Tons Cwt.	Total. Tons. Cwt
1872	6 165 15	.....	6,165 15
1871	5,579 12	914 12	6,494 04
Increase	586 03		
Decrease		914 12	328 09

YEAR.

1872	136,087 18	11,598 16	147.686 14
1871	124,920 14	47,865 07	172,786 01
Increase	11,167 04		
Decrease		36,266 11	25,099 07

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, August 30. R. A.	W. A.	AT PHILADELPHIA August 30. R. A.	W. A.
SCHUYLKILL.				
Lump	$—	$—	— —	
Steamer,	— —	— —	— —	— —
Broken,	— —	— —	— —	
Egg	5 25	4 75	— —	— —
Stove	5 50	5 00	— —	— —
Chestnut,	4 25	—	— —	
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 35	—	— —	— —
Broken	4 60	— —	— —	—
Egg	4 60	— —	— —	— —
Stove	4 85	— —	— —	— —
Chestnut	4 35	— —	— —	— —
Pea	— —	— —	— —	—
SPECIAL COALS				
Honey Brook, Le'h	W. A. 4 00@5 00		— —	— —
Spring Mountain "	" — —		— —	— —
Sugar Creek	" — —	@— —	— —	— —
Sugar Loaf	" — —	@— —	— —	— —
Old Compy's	" 4 00@5 15		— —	— —
Room Run	" 4 00@4 50		— —	— —
McNeal	" — —	— —	— —	— —
Girardville	" — —	— —	— —	— —
Hill & Harris	" — —	— —	3 10@4 00	—
Shamokin	" — —	— —	— —	— —
Lykens Valley	" — —	— —	— —	— —
Broad Top	" — —	— —	— —	— —
McMichael	" — —	— —	3 25@4 25	— —
Henry Clay	" — —	— —	— —	— —
Powelton	" — —	— —	— —	— —

Company Coals.

September, 1872.

	L.	Str.	Ora.	Eg.	Sto	Chest
*Scranton at E. Port	3 60	3 85	3 75	3 85	4 25	3 80
*Pittston at Newburg	3 50	3 50	3 50	3 50	3 70	3 50
*Lackawana at Weehawken	3 50	3 50	3 50	3 70	4 00	3 60
Wilk'b're at Hoboken	3 75	3 75	3 85	3 85	4 25	3 80
Old Co. Lehigh at Pt John'n	5 25	—	4 50	4 50	4 60	4 00
Lehigh at Eliz. Port	5 00	—	4 25	4 25	4 50	4 00

For freights to different points see "Freights."
To contractors only.

Prices at Baltimore—September, 1872.

Wholesale Prices to Trade

Wilksbarre, by cargo or car load	$4 60@4 85
Pittston and Plymouth, do	4 60
Shamokin Red or White Ash, do	4 75
Lykens Valley Red Ash, do	5 50
Zerba Valley	
Treverton	
By retail, all kinds per ton of 2,240 lbs	6 50@7 50
George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 60@4 65
Fairmont and Clarksburg gas f. o. b. at L. Point	6 00
BITUMINOUS COALS.	
Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Gumberland Vein Coal	
Consolidation Coal Co.'s on board N. Y.	
Maryland Coal Co "	

Prices at Georgetown, D.C., and Alexandria, Va.

September, 1872.

George's Creek and Cumberland f. o. b. for shipping $4 25@4 35

Prices at Havre de Grace, Md.

September, 1872.

Wilkesbarre and other White Ash for Cargoes	$4 25@4 50
Lykens Valley	@5 50
Shamokin Red or White Ash	4 25@4 50

Bituminous Coals (Cumberland).

Georgetown, F.o.b	$4.25
Baltimore	4.50
New York	6.60

Prices of Gas Coals.

September, 1872.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

	Coarse.	Slack.
Block House	$1 60	$— 75
Gowrie	1 60	— 75

Vessels are being chartered at $3 00 to $3 25.

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal,
Pictou	$2 25	1 25
Sydney	2 25	— 80
Lingan	1 60	— 80
Caledonia	1 60	— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm: 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.

	Currency.
Westmoreland	$7 10 @— —
Fairmount Gas Coal Co. of N. Y.	7 00 @— —
Despard Coal Co	7 00 @— —
Penn	7 10 @— —
Newburg Orrel Gas	— — @— —
West Fairmount Gas Coal	7 00 @— —
AT PHILADELPHIA.	
Westmoreland	6 00 @— —

Prices of Foreign Coals.

September, 1872.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	12 00@13 00
" House "	19 00@20 00
" Orrel	14 00@16 00
Per ton 2,240 lbs., ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$14 00@16 00
" Cannel, "	19 00@23 00
Per ton 2,000 lbs. delivered.	

Freights.—September, 1872.

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore	Anthracite. From Philadel'a.	Anthracite. From Elis. Port, Port Johnston, and Hoboken.	Anthracite. From Newburgh.	Anthracite. From Rondout.
Amesbury		2 80				
Bangor		2 90				
Bath		2 90				
Boston	2 75	2 75		1 75	1 95	
Bridgeport	2 30	2 30		1 60	1 15	
Bristol	2 40			1 40	1 60	
Cohasset Nar'ows	2 75					
Derby	2 75			1 25	1 45	
Dighton	2 50					
East Cambridge				1 75	1 95	
Fall River	2 40	2 40		1 40	1 60	
Hackensack						
Hartford	2 85	3 00		1 50	1 65	
Hoboken	2 00			50	60	
Jersey City	2 00			50	60	
Lynn					2 00	
Middletown				1 25	1 45	
Mystic	2 60	2 75			1 45	
New Bedford	2 50	2 75		1 45	1 65	
Newburyport	2 85	2 90		1 90	2 15	
New Haven	2 30	2 30		1 00	1 15	
New London		2 40		1 15	1 35	
Newport	2 40	1 90		1 40	1 60	
New York	2 10	1 90		50	60	
Norwalk	2 50	2 50		1 00	1 15	
Norwich	2 30	2 40		1 25	1 45	
Pawtucket	2 90	2 84		1 45	1 70	
Portland	2 75	2 75		1 75	1 95	
Portsmouth, N.H	2 90	2 90		1 85	2 05	
Providence	2 40	2 40		1 40	1 60	
Rockport						
Saco						
Sag Harbor	2 85	3 00		1 20	1 35	
Salem	2 75	2 80		1 75	1 95	
Stamford				1 00	1 15	
Stonington				1 35	1 45	
Taunton				1 90	2 00	
Warren				1 40	1 60	
TO RIVER PORTS						
Albany	3 00					
Catskill						
Cocksackie						
Coeyman's						
Cold Spring	2 30	2 20				
Fishkill						
Haverstraw	2					
Hudson	2 30					
New York						
Nyack	2 25					
Poughkeepsie	2 50					
Rhinebeck						
Rondout						
Saugerties						
Sing Sing						
Stuyvesant						
Tarrytown						
Troy	3 00					
West Point						
Yonkers						

Foreign and Provincial Freights.

September 1872.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons £
Liverpool, 5 per cent primage

TO NEW YORK.

Provincial.

Sydney	$3 05
Lingan	3 50
Cow Bay	3 75
Port Caledonia	3 10
Little Glace Bay	3 00
TO BOSTON.	
Sydney	3 00
Lingan	3 00
Cow Bay	3 00
Port Caledonia	3 00
Little Glace Bay	2 90

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven for consumption ($1 85 less 55c drawback	$1 30
For reshipment	1 75

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 66
C. R. R., N. J., Phillipsburgh to Elizabethport	0 98
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$1 99

MAUCH CHUNK TO PORT JOHNSON.

L. V. R.R., or L. & S. R. R. from M. C. to Phillipsb'g	$0 66
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	0 98
Shipping expenses	25
Wharfage	10
Total	$1 99

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	66
Morris & Essex R. R. Phillipsburgh to Hoboken	0 98
Shipping expenses	25
Wharfage	10
Total	$1 99

TO SOUTH AMBOY.

L. V. R. R.	66
H. & D. R. R. / Cam. & Am. R. R.	93
Shipping Expenses	3
Total	$ 199

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	0 7
C. RR. of N. J. Phillipsburgh to Elizabethport	0 98
Shipping expenses	2c
Wharfage	10
Total	$2 11

MARKET REVIEW.

NEW YORK, August 30, 1872.

IRON—The market for Scotch Pig is in a very quiet condition, but importers and holders continue to demand the prices asked last week. As stocks are not large, and no great quantity is expected, the market rules firm at $51,50a$52,50 for Eglinton, the former price ex ship, $55 for Glengarnock, $55a$56 for Gartsherrie, and $56a$57 for Coltness. We note sales of 100 tons Glengarnock here, and 130 tons Englinton at Philadelphia, both on terms not made public. American Pig continues very firm—No. 1 is not to be had, and $57 would be readily paid for immediate delivery; sales about 800 tons, for future deivery, at the works at $55 for No. 1, and $50 for No. 2, and 300 tons Allentown Forge, at the furnace, immediate delivery at $46—we quote No. 1 entirely nominal at $55a $57, No. 2 $52a$53 for Lehigh brands, and Grey Forge 48a$49. Rails are steady at $75 for New English ($80 to arrive), gold, with sales of 4a5000 tons at $75, and some extra brands at $76a$77 gold—we quote old $50a$52 gold, with sales of 200 tons D. H. and T. at $50 part cash; New American Rails have met with more inquiry, and some 5500 tons have changed hands at a private price—we quote them $85 currency at the mills in Pennsylvania, and $90 for future delivery. Scrap is dull and irregular at about $49a$51 from dock, and $52,50a$55 from yard, with sales of 600 tons from dock part at $50, and 250 tons from yard, part $50a$52,50 cash. Refined bar is very firm at the advance noted a week ago. Common Sheets are in demand and very firm.

PHILADELPHIA, Aug. 25—(From a circular of Edward Samuel.)—No change to note in prices. We understand that, owing to the high price of English Bar, our manufacturers here propose advancing the price o 2 cent per lb. after September 1st, making mill price 5.2 cents per lb.

COPPER—Manufactured is steady at our quotations. Ingot is in moderate demand, and the market is steady and unchanged; sales 300,000 lb. Lake at 33¼ cents cash and small lots, for future delivery, 33½ cash.

LEAD—The market for Pig is quiet and unchanged; we hear of no transactions. Bar 9½ cents. Sheet and Pipe 11, and Tin-lined Pipe 16½, less 10 per cent to the Trade.

STEEL—The market continues very firm at our quotations, with a scarcity of English cast.

TIN—Pig continues very quiet, and for the little business doing, prices favor buyers—a small lot Straits (50 pigs) sold a 33¾ cents, prompt cash—generally held at 34; English 33¼a33½, and Banca 42 all gold. Plates are rather quiet, bit prices are well sustained—the sales are 1000 bxs. Charcoal Tin, at $13,50a$13,87½, the latter for 500 assorted; 250 do. Charcoal Terne, 11,75; 500 do. Coke Tin, 10 by 20 $18, gold; 500 do. 14 by 20, and 250 do. I. C. W. do., on private terms.

ZINC—Sheet is quiet with small jobbing sales Am. Dry is quoted at 8a5 French 9a9½ Metallic 10½a11 Manganese 4½a5.

METALS.

NEW YORK, August 29, 1872.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, $7 ℔ ton; Polished Sheet, 3 cts. ℔ lb; Galvanized 2½; Scrap Cast, $6; Scrap Wrought, $8 per ton. All less 10 per cent. No Bar Iron to pay a less duty than 35 per cent. ad val.

	Store Prices.
Pig, Scotch—Coltness ℔ ton	56 00@57 —
Gartsherrie	55 50@56 00
Glengarnock	— —@55 —
Eglinton	51 00@52 50
Pig, American, No. 1	55 00@57 00
Pig, American, No. 2	53 00@54 00
Pig, American, Forge	48 00@49 00
Bar Refined, English and American	115 00@120 00
Bar Swedes, assorted sizes (gold	120 00@130 00

	Store Prices, Cash.
Bar, Swedes, 1¾ to 5 x ⅜ & ⅞ 2 sq. & 6 to 12 x ⅜ & ⅛	145 00@155 00
Bar, Refined, ¾ to 2 in. rd. & sq. 1 to 6 in. x ⅛ to 1 in.	— —@120 00
Bar, Refined, 1¼ to 6 by ¼	125 00@— —
Bar, Refined, 2½ to 2¾ round 1 & 1¼ by ¼ & 5:16	127 50@— —
Large Rounds	127 50@140 00
Scroll	140 00@170 00
Ovals and half-round	140 00@160 00
Band	— —@135 00
Horse Shoe	130 00@140 00
Rods, ¾ to 3-16inch	125 00@166 00
Hoop	145 00@190 00
Nailrod	@ 9
Sheet, Russia, as to assortment (gold)	17½@ 18
Sheet, Singles, D. and T. Common	—7 @— 8¼
Sheet, D. and T. Charcoal	—7¾@— 8½
Sheet, Galv'd, list 10 per cent discount	—@— —
Rails, English (gold), ℔ ton	75 00@ 77 00
Rails, American, at Works in Pennsylvania, currency	85 00@ 90 00

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 43
Copper Bolts	— @— 45
Copper Braziers, 16oz. and over	— @— 45
Copper Nails	— @— 47
Copper, Old Sheathing, &c. mixed lots	26 @— 28
Copper, Old, for chemical purposes, 14@16 oz	— @— —
Copper English Pig	— @— 33
Copper, American Ingot	33½@— —
Yellow Metal, New sheathing & Bronze	— @— 30
Yellow Metal Bolts	— @— 32
Yellow Metal Nails	30 @— 32

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1¼ cents ℔ lb; Pipe and Sheet, 2½ cents ℔ lb.

Galena, ℔ 100 lbs	$— @— —
Spanish (gold)	— —@6 50
German, do.	— —@6 50
English do.	6 75 @7 12½
Bar (net)	9 25 @— —
Pipe (net)	— —@11 00
Sheet	— —@11 00

Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. ℔ lb.

STEEL.—Duty: Bars and Ingots, valued at 7 cents ℔ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 3½ cents ℔ lb, and 10 ℔ cent ad val. Store prices.

English Cast (2d and 1st quality) ℔ lb	— 16¼@— 19½
English Spring (2d and 1st quality)	— 9½@— 10½
English Blister (2d and 1st quality)	— 11½@— 16
English Machinery	— 11½@— 13½
English German (2d and 1st quality)	— 11¾@— 12
American Blister "Black Diamond"	— —@— 12
American, Cast, Tool do.	— 15 @— 16
American, Spring, do.	— 9 @— 11
American Machinery do.	— 10 @— 10½
American German, do.	— 9 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent.; Roofing 25. ad val.

	Gold ℔ lb.
Banca	42 @—
Straits	34 @—
English	33½@34

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ℔ box	$13 50 @13 87½	$15 50 @16 00
I. C. Coke	12 50 @13 00	14 75 @15 25
Coke Terne	11 00 @11 25	12 50 @13 50
Charcoal Terne	11 75 @12 25	14 00 @14 50

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

Plates, Foreign	(gold) p. 100 lb.	6 87½@ 7 00
Plates, Domestic	p. lb.	— 8 @— 11

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c. per lb

Sheet	per lb.— 10 ½@ 11

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, August 29, 1872.

Our report from the San Francisco Stock Board is dated the 27th inst. The market has again declined with the tendency still lower, compared with of report of the 13th inst., the list has declined near by one-half; the reports for the dates of the 22nd and 27th are as annexed:

	Aug. 22.	Aug. 27.
Savage	— 104	87
Crown Point	— 133	110
Yellow Jacket	— 128	108
Kentuck	— 260	240
Chollar Potosi	— 72	64
Gould & Curry	— 150	127
Belcher "New Issue"	— 118	105
Imperial	— 10½	8
Hale & Norcross	— —	—
Eureka G. V.	— —	—

Something New!

ZELL'S

Illustrated Monthly Magazine,

CONDUCTED BY L. DECOLANGE, LL.D.,

Editor of ZELL'S Encyclopedia, &c., &c.

The best number of this new and beautiful serial will be issued in September, 1872. It will be especially the magazine for the cultured home, always up to the practical as well as the scientific spirit of the times.

It will be largely devoted to information concerning foreign and home countries, especially with those places remote from the general rush of travel. This information will be profusely illustrated by fine engravings from original sketches. The recent discoveries in science, relating to explorations and journeyings of travellers, inventions of pains-taking laborers in the field of the practical arts, the discoveries of celebrated chemists, physicians, botanists and mineralogists will be noted as they occur.

An original illustrated article on Naples will be published, besides other original tales, sketches of life and character, poetry and various literary papers from the pens of writers of the first talent.

The editorial staff will be under the direction of L. DE COLANGE, LL. D., so well and favorably known as the editor of "ZELL'S ENCYCLOPEDIA."

The publisher will spare no pains or expense to make this magazine well worthy the reading public, and has placed the subscription price so low as to be within the reach of all.

Subscription price, $2 00 per annum.

Single numbers 20 cents.

A specimen copy will be sent to any part of the United States on receipt of 10 cents in postage stamps.

T. ELLWOOD ZELL, Proprietor,

17 and 19 South Sixth street, Philadelphia,

sept3:3m 5 Beekman street, New York.

COAL SHIPPERS.

R. R. HEFFORD & CO.,

Forwarders and Dealers in

ANTHRACITE, CANNEL, BITUMINOUS AND BLOSSBURG

COALS,

OFFICE, No. 2 MAIN STREET AND No. 1 CENTRAL WHARF,

Docks opposite foot of Main Street,

BUFFALO, N. Y.

R. R. HEFFORD. JAMES KELLY.

Railroad Iron, Iron Ore and other heavy Freights Docked and Forwarded. april 9:3m

CUMBERLAND COAL,

MINED BY THE

CONSOLIDATION COAL COMPANY,

Of the best quality for manufacturing, steam generating, domestic purposes.

Orders received by the Cargo at

New York Office, 71 Broadway.

New England Agency,

STEVENSON & PIERSON,

48 Kilby street, Boston.

Baltimore and Georgetown Agency,

G. MEREDITH, South Gay street,

mch7;tf Baltimore.

THE NEWBURGH ORREL COAL COMPANY

Mines at Newburgh, Preston Co., W. Va.

Company's Office, No. 52 S. Gay St. Baltimore, Md.

C. OLIVER O'DONNELL.....President.

CHAS. MACKALL.....Secretary

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. sep21-1y

THE DESPARD COAL COMPANY OFFER THEIR Superior DESPARD COAL to Gas Light Companies throughout the country.

MINES IN HARRISON COUNTY, West Virginia.

Wharves, Locust Point, / Company's Office, No. 29 South st. } Baltimore.

AGENTS:

PARMELEE BROTHERS, No. 32 Pine street, New York. BANGS & HORTON, No. 31 Doane street, Boston.

Among the consumers of Despard Coal we name Manhattan Gas Light Co., New York; Metropolitan Gas Light Co., New York; Jersey City Gas Light Co., Jersey City, N. J.; Washington Gas Light Co., Washington, D. C. Portland Gas Light Co., Portland, Maine.

☞ Reference to them is requested. may30-1y

COXE BRO.'S & CO., CROSS CREEK COLLIERY, MINers and Shippers of the Celebrated

Cross Creek Free Burning Lehigh Red Ash

COAL.

FROM THE BUCK MOUNTAIN VEIN.

OFFICES:

Philadelphia, No. 206 South Fourth street.

Drifton, Jeddo P. O., Luzerne Co., Pa.

Agent in New York, SAMUEL BONNELL, Jr., Room 43, Trinity Building,

feb-1 111 Broadway.

DETMOLD & COX,

ANTHRACITE AND BITUMINOUS

COALS.

Office, 40 Trinity Building, New York. jan 23-1

STEPHEN S. LEE & SON,

Miners and Shippers of

GEORGE'S CREEK COAL,

SWANTON MINES,

No. 49 West Lombard street,

may28-tf BALTIMORE.

MARYLAND COAL CO.,

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English Professional Meetings.

The season for the meetings of professional societies has come, and men of all pursuits are busy exchanging notes, and visiting the great centers of industry. We intend to reprint some of the papers read before engineering and mining societies in England, papers which in fitness to our wants and patness to the questions current among us, might have been read before our American societies, and would, we are sure, have been received with acclamation. At present we shall give a few of the more noticeable sights witnessed by the mechanical engineers who met at Liverpool, in their visits to neighboring workshops, for which we are indebted to *Engineering*.

The Wigan Coal and Iron Company is a powerful corporation, at present, we believe, raising over 2,500,000 tons of coal per annum, and turning out yearly about 140,000 tons of pig iron. The seams worked by the company include one of cannel coal, and also the well-known Hartley mine, and other portions of the Lancashire coal beds. The coking coal obtained from this district contains a certain percentage of sulphur, which, if not removed or greatly reduced, would render the coke unfit for producing the best marks of Bessemer pig, which form the staple products of the company, and this has led to the extensive employment of coal-washing machinery, and with very successful results. The coal, after being crushed by crushing rollers, is lifted by elevators, and delivered into washing chambers or bashes, in each of which the water is made to rise and fall rapidly by the action of a piston working in a cylinder connected with the chamber, this piston being 36 in. in diameter, and making 150 strokes per minute. The length of stroke is 3 in. The coal rests on perforated copper sieves, and by the pulsating action of the water the good coal is washed over the edges of the sieves, while the pyrites, being heavier, remains in the latter, and is removed at suitable intervals. The loss by washing is about 10 per cent., and the washed coal is coked in 8-ton ovens, the coking process occupying five days.

The iron ore used consists principally of the well-known red hematite of the Ulverstone district, but a percentage of argillaceous Belfast ore is also employed for the purpose of bringing some alumina into the charge, thus forming a flux. Limestone is also added, the proportion of this latter material used when making Bessemer iron being very considerable.

The blast furnaces are ten in number, five of them being each 55 ft. high by 18 ft. in diameter at the boshes, and the remaining five being each 80 feet high, with a diameter at the boshes of 24 ft. The furnaces are close topped, being fitted with the arrangement of bell and hopper similar to that used in the Cleveland district. The produce of each of the larger furnaces is about 350 tons, and of the smaller about 300 tons per week.

At the Rosebridge Colliery, the Engineers saw one of the deepest coal mines in the country, one of the shafts being 815 yards deep and 16 feet in diameter. The speed of hoisting in this shaft is something marvellous. On several occasions when the time of lift was noted, it was 56 seconds, while on one occasion it was 52 seconds only. The former time gives a mean speed throughout the ascent or descent of 29.8 miles per hour, and the latter a mean speed of 32.06 miles per hour, but the maximum speed during the middle part of the run was far in excess of this average, and was probably nearly or quite 40 miles per hour. The shaft is worked by a fine pair of winding engines, constructed by Mr. ROBERT DAGLISH, of St. Helen's, an engineer who has been very successful in the construction of winding engines working at a high speed. As this was the upcast shaft, the visitors probably found their ride more interesting than pleasant.

At the shops of the London and North-Western Railway Company at Crewe, much interest was excited by the performances of one of the little 18 in. gauge locomotives, which run in and out of nearly all the shops at Crewe, hauling behind them loads which appear ridiculously disproportionate to their size. It is, in fact, positively amusing to witness the cheeky manner in which one of these little engines will walk off with a boiler mounted on a pair of miniature trucks, running round apparently impracticable corners, and backing it into out-of-the-way recesses in a way that must be seen to be appreciated.

In the iron foundry of the same establishment, they found that Mr. Webb is now working his cupolas with closed tops, and in connexion with a chimney, and is saving some five and twenty per cent. of blast thereby. This is a practical result of much value to iron founders.

Another important hint was gained by seeing the way in which mixed brass and iron borings, and the refuse from the brass foundry are now treated at Crewe. The separation of brass and iron borings by the ordinary process is a tedious affair, and in some cases scarcely pays for its cost; but Mr. Webb accomplishes the desired object very simply and economically by a smelting process. The mixed iron and brass borings, and the refuse from the brass foundry are mixed with lime stone, coal and oxide of iron or scale, and, on this mixture being smelted, the brass settles to the bottom, and is tapped and run into ingots. So far as we are aware this mode of smelting mixed borings and refuse with oxide of iron, so as to obtain a fluid slag, from which the brass readily separates, is an entirely novel one, and we believe that its value will be generally recognised in large establishments.

Before leaving this portion of the works the visitors were shown a number of tested samples of the Bessemer steel plates now being used at Crewe for the construction of boilers. Mr. Webb is adopting steel entirely for the construction of boiler shells, the rivets being also of steel, and he stated that he hopes ultimately to be able to employ the same material for fireboxes and tubes, to the exclusion of copper and brass. The boiler plates used at Crewe are all made on the works, and a sample is cut from every plate and tested. The plates are required to have a breaking strength of 34 tons per square inch, with an elongation of 25 per cent., and a 5-8th in. hole punched in the sample strip, about 2½ in. wide, has to stand being drifted out to 2 in. in diameter without the plate cracking. We should much like all those who have still an antiquated horror of steel could examine carefully the material which is now being used at Crewe. We know that there is much plate steel made which is utterly unfitted for boiler work, but so also is there much plate iron equally unfitted; and as it would be silly to argue from this latter fact that wrought iron is unsuitable for boiler-making, so, also, it is foolish to object to the use of steel simply because some steel is untrustworthy. The present practice at Crewe affords ample evidence that, by proper care, it is possible to produce a material which, for boiler-making purposes, is vastly superior to the very best wrought iron obtainable, and we consider that Mr. Webb is doing the profession good service by the manner in which he is availing himself of the resources at his command to introduce such a material largely.

We may mention here, by-the-bye, that for some months past Mr. Webb has been running one of his shunting engines at Crewe with anthracite coal. This engine has a steel boiler, tubes, and firebox, and is fitted with an arrangement of water-grate. The performance of this engine has been most satisfactory, and it is probable that water-grates will shortly be applied to other engines, to enable the use of anthracite to be extended.

Accidents to Blast Furnaces.

It is common for writers on metallurgy to enumerate the accidents to which blast furnaces are liable. To this list, we grieve to say, must now be added a hitherto innocent source of trouble—*umbrellas*. While the British Mechanical Engineers were at Crewe they were taken to see a "blow," which was, however, delayed by a peculiar mishap.

The Bessemer blowing engines at Crewe were originally fitted with Mr. Bessemer's india-rubber ring valves, but some time ago these were removed, and piston valves worked by eccentrics substituted in their stead. These piston valves work in open ended cylinders placed at the top of the blowing cylinders some feet above the ground level. On Friday last, just before the "blow" was commenced, and while the engines were moving very slowly, Mr. BRAMWELL entered the engine-house, and unwittingly pointed his umbrella at the end of one of the piston valve cylinders. The umbrella was loose, and the rush of air entering the valve cylinder caught it and drew it in, tearing the silk from the frame. At the return stroke of the valve the silk wrapped round the edge of the latter, jamming in between the valve and its cylinder, and actually bringing up the engines. Nobody gets any sympathy for disabling his umbrella any more than he does for smashing his hat, and when Mr. BRAMWELL'S protector from showers was first partially extricated from the valve cylinder in a decidedly fragmentary condition, those present were rather inclined to regard the matter as a good joke. A very little examination, however, showed that the accident was no laughing matter, for the jamming of the valve had thrown such a strain on the valve rod that the rocking shaft, through which the valve obtained its motion, was severely twisted, ond one of its plummer block brackets broken. Moreover, the valve was so thoroughly jammed that it was evident that its removal would be a work of time, so that altogether the engine was thoroughly disabled. Under these circumstances the only course open was to disconnect the engine, and attempt to blow the charge with the other engine only, and ultimately this was safely accomplished.

Writing from so distant a point of view we should say that English blast furnaces stood in considerable danger from this new enemy. The Englishman on his travels is inseparably connected, in the American mind, with an umbrella, and if that hitherto harmless companion is to appear as a destructive implement, we fear a new element of disorder is introduced into the already tottering British iron trade!

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The dues for the year ending May, 187½ are now payable. All members and Associates who have not paid their dues are requested to do so at once, by sending in postal orders, or checks, or money, ten dollars to the Secretary.

All members and Associates who pay their dues for each current year, strictly in advance will have sent to their address, regularly and weekly, the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute and all notices of meetings. Back numbers cannot, as a general rule, be sent.

II. It is expected that the more important papers read before the Institute, and the debates thereon, will be published in annual or occasional volumes to which those Members and Associates will be entitled who have paid their dues.

III. All authors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

IV. The ninth rule has been amended, so that there will be hereafter three meetings a year, in February, May and October. The meeting next October will be held at Pittsburgh, Pa.

MARTIN CORYELL, Secretary.

Wilkesbarre, Pa.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
JOHN A. CHURCH, E. M.
Editors.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.* It is the Organ of the American Institute of Mining Engineers, and is regularly received and read *by all the members and associates* of that large and powerful society, *the only one of the kind in this country.* It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employees.

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CONTENTS FOR THIS WEEK.

Heald and Sisco Pump 145
Metallurgy, and its Relation to Other Sciences 145
Steam Hammer Foundations 146
NOTES ON A METALLURGICAL JOURNEY IN EUROPE—The Copper Process at Agorda 147
THE COAL TRADE 149
THE MARKET REVIEW 151
Advertisements 151
English Professional Meetings 152
Accidents to Blast Furnaces 152
American Institute of Mining Engineers 152
The Blake Crusher 153
Is it Silver, Lead or Brass? 153
The German Offer for Ore 153
The New Polytechnic School at Aix-la-Chapelle 154
EDITORIAL CORRESPONDENCE:—Central City, Colorado 154
Notes from Georgetown 155
MINING SUMMARY:
Nevada 155
Arizona 156
Advertisements 156

We notice that Mr. J. ALDEN SMITH has received the appointment of Territorial Geologist to Colorado. This is a Territory which, after lying many years under a pretty thick cloud, is now feeling the reviving effects of a good clear sun of prosperity. Its mining interests are growing not only steadily but rapidly, and whatever contributes to establish them more firmly is well done.

The Blake Crusher.

BLAKE Brothers, owners of the Blake Crusher, have obtained an extension of their patent. Theirs is one of the few cases in which such a favor is not only justifiable but entirely proper. The "Blake" was a new idea in crushing machines, and was received with wonder in all those parts of the world where the stamp and the Cornish roller had for generations been the only means of reducing the size of ore. We well remember the doubt at first, and then the delight with which it was received in Germany. A careful record of the work done by the first machines introduced was made and published, and the old world rapidly accepted the new comer, finding it advantageous, even in that region of cheap labor, to replace the work of a dozen men by one machine. Imitators sprang up by the score and we would hardly dare to guess the number of machines which are the Blake with only a small difference, which is rarely, if ever, an improvement. But the owners have themselves been the busiest innovators of all. Retaining the principle of the first machine, they have altered its construction a number of times obtaining greater strength and greater simplicity by every change. A new form has just been brought out, which we shall soon illustrate.

Is it Silver, Lead, or Brass?

Mr. HENRY SEWELL, of Salt Lake City, has written a couple of letters to the Salt Lake *Herald* in defence of the Utah Silver Mining Company and its manager, Mr. J. R. MURPHY. What Mr. SEWELL really ought to explain, namely, the part he played in the sale of the property to the company, and the report he made upon it at that time, he very discreetly leaves untouched, contenting himself with a repetition of the history of his brilliant achievements in other countries and on other mines. It is his favorite notion that nobody has any experience "in limestone formations" but himself. When his calcareous career is ended, he ought certainly to be provided with a sumptuous mausoleum of "overlying limestone," inscribed with some highly concentrated epitaph, such as:

This is the man
Who reported on the Van!

The Van, it must be understood, is a huge lead mine in Great Britain, which was trebled in value by Mr. SEWELL's wise advice "as to the necessity of increasing the concentration department;" and he has named the Utah company's mine in Bingham cañon the Great American Van, because that is going to do likewise.

We have no desire to discourage the company, or to follow up its superintendent in a hostile spirit. No matter what our opinion may be about Mr. MURPHY, if he and his assistants succeed in redeeming the concern, they will deserve and receive credit. But Mr. SEWELL, whom we have perhaps unnecessarily spared hitherto, now invites our attention for a two-fold reason; first, because he takes occasion to stigmatize the honest and fearless criticisms of this journal and its contributors as anonymous and false; secondly, because he is systematically puffing himself in the newspapers, in order to maintain an influence, and a reputation which the result of his recommendation in this affair has put in serious peril.

We take leave to remind Mr. SEWELL that he helped to sell the Bingham cañon mines, not as lead, but as silver mines. We are not aware that any sane man proposes to go into lead-mining as such in the Territory of Utah. And we do not find in his letters anything about *silver*, though, as he may remember, there was a good deal on that subject in his first report.

His triumphant argument is this: "Give him a call at Bingham, and you will have the proof of the pudding in the shape of immense bodies of galena, and the ore averaging over sixty per cent. in lead, as is practically proved at present by the daily smelting of one furnace, say fourteen tons of ore producing about six tons of bullion every twenty-four hours."

We need hardly say, that immense bodies of galena prove nobody's "ability." The question of ability, however, comes in when we inquire with how much skill it is treated. We accept for the present Mr. SEWELL's own figures, from which it appears that out of 14 tons of ore, containing over 60 per cent., or 8,4 tons of lead, about 6 tons of bullion are obtained—a loss of nearly thirty per cent. What the bullion is worth in silver, he does not care to say; but as Mr. MURPHY is reported in a recent London *Mining Journal* to have turned out $800 in five days' smelting, our readers can figure for themselves. We suggest, however, that Mr. SEWELL's six tons and sixty per cent. are both too high. The affair is not quite so bad as he makes it.

But we have a vague recollection that this furnace, which smelts fourteen tons of ore a day, was erected at considerable cost, to carry a charge of forty-five tons. Is all the rest charcoal at 30 cents a bushel, and iron ore at $25 a ton? Or has Mr. SEWELL advised the concentration of the furnace?

This it is, that a man of world-wide experience in limestone pronounces "splendid results." We do not now declare it to be disastrous failure. So long as people are experimenting in good faith, they may have all sorts of luck with their slags and their fluxes and their bullion, without deserving to be utterly condemned. But they must not attempt to convince practical men that an enterprise is a splendid success which begins with silver, continues in lead, and gets to running on brass before it has paid expenses, to say nothing of dividends.

THE ENGINEERING AND MINING JOURNAL does not purpose to interfere with private business. We never attacked any mining scheme before it had challenged inquiry by addressing its prospectus to the public. After that has been done, the reports of experts and the promises of directors are fair subjects for independent criticism.

In the present instance, we have refrained hitherto from mentioning Mr. SEWELL at all, there being, perhaps, a possibility that his prophecies about this enterprise, though mistaken, were sincere. Now he voluntarily adopts and endorses the results already achieved, and presumes, moreover, to pronounce those who cannot agree with this startling proposition, "persons of very doubtful standing in their profession." We have three things to say to him: first, he should keep out of the papers altogether, for a little while, till this matter has really been decided; secondly, if he ever tries to demonstrate a "success" again, let him tell plainly, so that practical men can understand, the amount of expenses for labor, fuel, flux, loss, freight, sampling, commissions, interest, salaries of five different managing and consulting officers, etc., etc., per month, and the amount and selling price of the bullion produced; thirdly, if he does not possess these items, let him apply to us, and we will endeavor to enlighten him. If he undertakes to go by the figures he once obtained on the "Van," he will certainly be, as the old song has it, "a used-up man."

The German Offer for Ore.

The boldest bid yet made for the business which American mines can give smelters is undoubtedly that of the German Smelting Works, whose circular will be found in our advertising columns. For silver they pay about as follows: 10 ounces to the ton 35 per cent. of its value; 20 ounces 62 per cent; 30 ounces 75 per cent; 100 ounces 90 per cent; and for quantities over this a slightly increasing percentage. Of course no one would ship silver ore of less than 90 to 100 ounces, depending upon the presence or absence of lead, so that the offer is practically from 90 per cent. for 100 ounce ore up to 95 per cent. for 500 ounce ore; with an addition under usual circumstances of two per cent. for ores that contain more than one per cent. or 292 ounces. The payment for gold ranges from 80 per cent. for ores containing one-tenth ounce, to 92 per cent. for ores with 20 ounces. For lead and copper the prices appear less than our American works, treating the ore for the American market, could give; for the value of lead is calculated at 3½ cents a pound, and copper 16¼ cents a pound, both in coin; but this tariff was calculated when prices were low. Whatever advance has been made is added as a special rate to the tariff price. These, however, are but secondary constituents in most Western ores. We should add that the German works propose to issue a tariff for the purchase of nickel and cobalt ores.

The works which have combined for the purpose

of establishing an agency in this country are the world famous establishments in the Hartz mountains, in Freiberg and Mansfield. Though they have borne the best reputation for years and even for centuries, and have received foreign ores whenever brought to them, they have not until lately made special efforts to obtain foreign trade. A year or so ago the whole amount of foreign ore amounted to only 500,000 thalers for the year. But during only the first half of this year they have received 2,500,000 thalers' worth.

They possess undoubted advantages for the work. Treating vast quantities of ore they are able to undertake the reduction of difficult ores like the argentiferous blende of Colorado, without dread of the consequences, for they can so dilute it with their own ores that the troublesome zinc shall form but a small part of the whole charge.

At Freiberg similar ores are treated with success, but they are far less argentiferous, and it is doubtful if the careful Freiberg people would venture to put such rich ores through their peculiar dezincing process. We propose to publish some articles on the works which are now bidding for the American trade, so that our readers will know to what manner of works they are sending their ore.

The New Polytechnic School at Aix-la-Chapelle.*

A thick pamphlet comes from Germany, as a reminder of an institution of no little importance to the large portion of our population interested in some species of technical employment or venture; for at a time when considerably more than one thousand young Americans are acquiring, or completing their educations in the German universities and professional schools, the rise of a new Polytechnicum there becomes, in a secondary degree, a national event to ourselves.

Perhaps no better place could have been selected for a school of technical science than Aix-la-Chapelle, lying as it does in the heart of the districts, the coal seams of which form the bases of the industries of Rhenish Prussia, Wesphalia, Belgium and Luxemburg, a position which renders it not only a very important local center for various branches of manufacture, (pig and bar iron, Bessemer steel, needles, machinery, lead, silver, zinc and textile fabrics,) but a headquarters from which either one of the above mentioned industrial districts can be reached in a couple of hours by rail.

The school has been started on a scale not unworthy of the advantages of the situation. The main building forms three sides of a hollow square 250 feet on a side, besides the Laboratory which is 175 feet in length. These superb buildings are devoted to the Library, Lecture Rooms, Workshops, Collections, etc.

The Collections are laid out on a very large scale, and although the school is only beginning its second year, have already attained considerable dimensions, by means of purchases and gifts. Among the latter is for example, a complete set of the patent specifications of Great Britain presented by the English government.

The corps of twenty-five professors is of picked men. WULLNER the physicist, RITTER the mechanician, DÜRRE the metallurgist, LESPEYRES the mineralogist, *et al*: are known far and wide.

In consequence of the resources at its command, the Royal Polytechnicum at Aix-la-Chapelle took its place from the beginning in the first rank of the similar schools of Prussia, such as the Royal Trades School, Academy of Architecture and Academy of Mines at Berlin, and the Royal Polytechnic School at Hannover.

A school beginning with such rich endowments, in a country where education has reached so elaborate a development, and has itself so long formed a subject of study as is the case in Germany, was not likely to miss the opportunity for improving a precedent, and probably a more elaborate and better organized plan, (though professedly not yet perfected,) was never laid before the public by a professional school, than is exhibited in the programme for the ensuing year. To enter into a full discussion of the courses of lectures to be delivered, (of which brief analyses are given in the programme,) would require much space and time. No less than ninety-four separate courses will be held between October 7th of the present, and August 1st of the coming year. Suffice it to say that they include discussions of almost every topic of interest to the technologist, from Mediæval Architecture to Telegraphy.

Especially worthy of mention (and imitation), are the exercises in extemporaneous and independent investigation and construction, which of late years have played a more and more important part in the German system of higher education, with incalculable advantage to the pupils, and in many cases of great direct importance to the world. In these exercises the classes are voluntarily resolved into what might be called miniature academies of science, presided over by the professor. Subjects for research are proposed by president or members, and any of the latter can be called upon to discuss it, under the free criticism of the whole house. Suggestions and corrections come in from all sides, and the subject is not seldom illuminated by a most desirable accumulation of brilliant ideas. Subjects suggest themselves much faster than they can be disposed of, and, from the surplus, selected themes are discussed at their leisure by those interested, in essays which are afterwards read before the academy. It is needless to point out the readiness of resource, the well-balanced critical habit of mind, and the vividness of the impressions gained in this way. Besides their formal discussion in the lectures, such subjects as mechanical and metallurgical construction are treated in this way at Aix.

Prefixed to the programme is an excellent chapter of advice to those who think of becoming students, in which the questions of preparatory study, work in the shops, and the objects of Polytechnic study are treated of.

Before entering upon the professional courses of the school, a knowledge of mathematics, including the solution of equations of several unknown quantities, trigonometry and logarithms, of one foreign modern language, and of mechanical drawing is required of natives, and earnestly recommended to foreigners.

The much vexed question of work in the shops is not sweepingly and dogmatically treated, but with careful discrimination in regard to previous training, temperament, etc. It is noticeable that *no one* is advised to spend less than one year as a workman.

In respect to the objects and limitations of technical education, the prefatory chapter distinctly disclaims what every practical man knows that no school can be in a condition to fulfil. "The institution furnishes no thoroughly accomplished practitioners, and specialists, but puts its pupils in a position to become such in the shortest possible time, and withal to possess the knowledge necessary to independent action.

Aix-la-Chapelle lies in a beautiful country, possesses many resources, and is vastly cheaper than Berlin or Vienna. It is to be hoped that Americans will be found not less ready to take advantage of this newest opportunity for making use of the toilsome accumulations of German research, than they have already proved themselves to draw on its older repositories.

* Programm der Königlichen rheinisch-westphälischen Polytechnischen Schule zu Aachen, für den Cursus 1872-3."

The Star Hoop Mill, LINDSAY & MCCUTCHEON, Pittsburgh, lately made in a run of nine hours on an 9-inch hoop train having detached "bull head" rolls, and with one crew of hands, 33,442 pounds of 1¾-inch hoop iron, number 17 gauge, and from one furnace. They use 1½-inch square billets. Their ordinary day's work is from eleven to twelve tons.

EDITORIAL CORRESPONDENCE.

Central City, Colorado.

The present dullness of mining matters at Central, which has heretofore been a region of steady production, even in the darkest times, is not difficult, though it may be somewhat tedious, to explain. It is a great contrast to the activity prevailing in the silver districts of Clear Creek County; and this contrast, which increases the surprise of the casual observer, is really one cause of the depression at Central. Not only the floating population, but many miners on a small scale or on leases, go to the district where "things are livliest," and where there is the greatest chance for lucky strikes.

Central City labors, in this respect, under the disadvantage of being an old and thoroughly prospected camp. Her hills are covered with "locations" as thick (and a good deal thicker) than they can lie; and no sane man would undertake to edge a new discovery between them, so long as the ancient claims hold good. Hence the only chance for small adventures has been the leasing of mines belonging to half-defunct or idle companies, and the extraction of ore from them. A good many mines were worked, last year and this, in such a way; but the system is one which soon comes to an end, as the lessees are not likely to incur the expense necessary to keep the work well opened in advance, or preserve the mines throughout in good condition. Moreover, they are liable to be enticed away at any time by the hopes of greater profit elsewhere, or to stop at once if the result of a single run of ore discourages them.

For several years, the best mines at Central—those of the Gregory lode—have been idle, on account, it is said, of a quarrel among the owners about the expense of pumping. There is nothing in the United States law about this important question; but the Colorado legislature has passed an act, approved Jany. 31, 1872, which provides that when contiguous or adjacent mines have a common ingress or subterraneous communication of water, their owners or occupants shall share in due proportions the expense of drainage; on equitable terms, one or more of them may undertake it, and recover damages from the rest. Under this law, I presume, the Briggs company has begun to take out the water from its mine, and, in doing so, to drain the whole lode. It is a pity that the dead-lock which has existed so long did not bring about a consolidation of ownerships. The Gregory is a magnificent mining property, slaughtered by the process of subdivision; and I fear the evil is now beyond remedy; but it is a matter for rejoicing that the Colorado statute, which reads as if it were provided to meet this very case, at least permits by its wise provisions, the working of such of the claims as were hitherto involved in the common stoppage, because their owners could not afford to drain for nothing the mines of their neighbors. We may now expect a renewal of production from several of them, which will add greatly to the yield of the district.

The Briggs Company are employing two large Knowles pumps, one being kept in use and the other on hand in case of necessary substitution. The pump is floated on the surface of the water in the shaft, and descends as the water is lowered, steam being carried down to it from the surface. By this arrangement, the suction is kept at its best, and the result has been a satisfactory, and even surprising, progress in the removal of the water.

The new mining law is destined, I think, to work great benefit to this district. The tunnel section, weich will give so much trouble in newer districts, will be comparatively harmless here, because the veins have been mostly discovered, and opened more or less on the surface. There is no danger that tunnels will monopolize the ground. On the other hand, thousands of old claims will be annihilated next May, by the failure of their owners to appear and perform the necessary work; and the way will

be opened for legitimate mining without fear of ruinous litigation.

The railroad is to be completed, at least as far as Black Hawk, this fall. The present terminus is Golden City, 25 miles from Central, and 17 miles from Denver. It remains to be seen whether the establisment of railway communication with Denver will have any decided effect in reducing the cost of mining supplies. It is of course possible that the company may charge just enough for freights to keep teamsters off the road, and yet not enough to materially lighten the burdens of the community. But I hope (in common with the merchants and citizens) for better things. It would have been well, perhaps, to bind the railroad company somewhat, in this respect, before voting to it some $300,000 in county bonds.

Professor Hill's works are running as usual. The Professor being, at the time of my visit, "over the range," looking after the mines and ores of the South Park, I was cordially met by Messrs. BEGGER and ABBEY, and conducted through the establishment. It is not essentially changed from its former arrangement, except by enlargement. There are now three smelting reverberatories, besides the five roasting reverberatories; and a new shaft-furnace has been erected, for the purpose of smelting the rich slags which have accumulated from the treatment of certain kinds of ores, particularly the blendiferous ores of Clear Creek County. Professor HILL has brought ores from Georgetown to the amount of some $232,000, it is said, and wants no more at present.

The ore yard and wasting-heaps contain between 3,000 and 4,000 tons of ore, from all parts of the Territory. Here one may study the products of Cariboo, Central, Idaho, Georgetown, Argentine, and even from beyond the range, of the new mines on Mount Lincoln. The yard is an epitome of the mining industry of Colorado; and simple as the matte-smelting process which is here adopted, may seem to the book-student, or the careless observer, its application to ores of such complicated and various character requires great metallurgical skill and unflagging watchfulness. That these qualities are displayed in a high degree by Mr. BEGGER, and that the present splendid success of this establishment is largely due to his scientific and practical mastery of his business, everybody in Colorado is thoroughly aware.

R. W. R.

DENVER, Aug. 12, 1872.

Notes From Georgetown.

I.

TO THE EDITOR.—

SIR: This silver mining region, which has been struggling for years to emerge from the position of a third or fourth rate camp, has suddenly leaped within the last year to the eminence of the best district in Colorado. It is true, the discovery of a number of extraordinarily rich and extensive veins has done its part in this change, but the main spring has been undoubtedly the different spirit, which has come over the mine-owners. Where locations were formerly made "to sell," only sufficient work being done to hold the claims and to get specimens for "average" assays, mines are now opened and ores are sold. This brings mining down to a regular business, which it should be in all cases; and the effect is immediately seen in "flush" times and smiling faces. There is indeed so much ore taken out in Georgetown and vicinity at present, that there is no market for a very large portion of "second class" ores. The beneficiating works of the place, Stewart's, and Palmer and Nichol's amalgamating works and Pierce's smelting works are over-stocked, and the ore-buyers and sampling works will not buy ores containing less than 250 to 300 ounces. Besides the above works, there is only the small mill of Mr. DIBBENS at Argentine, which works second class ore, but these works are more than supplied re from the mines lying on the mountains above, so that they offer no means of relief for the by far greater number of mines below.

Of the mines which have sprung into prominent notice during the last year, the Pelican, Maine, Saco, and Antelope have distinguished themselves by the extraordinarily rich ore, even for Georgetown, which they produce; and the Pelican especially has done wonders. This will be understood, when I say that this mine has produced according to the Superintendent, Mr. John McNiff, $580,000 since May 1871, and this only during the process of opening the mine. The only part stoped out is about 20 ft. long by 40 ft. high, and all the rest of the stopes—very large, as will appear from the following—are standing untouched. Their value is computed by competent judges at something very near one million of dollars.

The Pelican is situated 700 ft. above the bed of Clear Creek on Sherman mountain, not far from the Silver Plume and the Snow-drift, immediately above the village of Silver Plume. This part of the mountain has been very much prospected and is thickly covered with conflicting claims. It is no wonder, therefore, that immediately upon the discovery of the Pelican's size and the very high grade of its ores, countless counter claims should have been set up. Litigation was thus at the door, as it seems regularly to be with every good mine, before operations were fairly commenced. But the owners, poor miners up to May 1871, with nothing to call their own but their debts, have had the good sense to prefer settling their difficulties peaceably, to furnishing a harvest for lawyers; and they have thus paid out of the proceeds of the mine $140,000 to other claimants. This has brought them so far, that they expect to receive the patent for their mine shortly, all the papers being now in Washington. Yet there are still 5 suits which will have to be settled hereafter. The claims bought out by the owners of the Pelican to settle difficulties are the Elkhorn 1400 ft. Zilla 3000 ft., (these two being the same vein) Unicorn 3000 ft., Forest 3000 ft., Mahany 700 ft., Calary 700 ft., Bellwether 1400 ft., Moss (undivided west half) 700 ft., Spruens 1400 ft., and the Umbatonga 1400 ft. The Pelican proper and the Zilla are really the only lodes of all these which have any great value in regard to quantity and richness of ore. They both run E. 12° N., the Pelican dipping very steeply, while the Zilla, which is on top 30 or 40 ft. from the Pelican, comes in the lowest level to within 10 ft. of it and will probably run into it. The Pelican is the largest vein, being from 2 to 8 feet wide. The mineral, principally zinc blende with stromeyerite and occasionally silver glance, occurs in solid main seams of from two inches to one foot in thickness which have the direction of the vein, and in smaller seams, ramifying through the gangue and even through the horses in the vein. The gangue matter is besides intermixed with spots of mineral.

The picked first class ore averages, according to the care taken, from 350 to 950 ounces per ton; and the second class, such as is sold to the mills, assays 200 ounces. There are now 1000 tons of this second class ore on the dump; and owing to the inability of the mills to work all the ore offered them, there is no very speedy prospect of its sale. A better state of affairs is looked for as soon as Judd and Crosby's mill, which is now very near completion, shall be in running order. The Pelican and Zilla are now opened with four tunnels, all of which are on the vein except 350 ft. of cross-cutting on the lowest, and 5 wings and shafts. Commencing from above, the tunnels have the following lengths and amounts of stoping ground above them, No. 1 is 250 ft. long and has a block of stoping ground equal to 150 ft. in length and 100 ft. in height above it, No. 2 is 156 ft. in and 50 ft. below No. 1, No. 3 is 40 ft. lower and 250 long, No. 4 is 80 ft. below No. 3 and 500 ft. long. Assuming an average thickness of the vein of only two feet and calling all the ore second class, the amount in sight would figure up as worth over $1,500,000. It is thus seen that the owners are within bounds in their estimate of the amount of silver in sight. Some of the tunnels are still being driven ahead, and it is now intended to commence stoping on the decomposed ore above the first level and to take out all the ore to the grass roots. The names of the owners of this wonderfully rich mine are E. S. STREETER and THOS. MCNIFF, the latter being the son of the Superintendent.

The Antelope is a little lower on the same mountain side with the Pelican. It carries also ore of high grade, but is not far advanced in development.

The Maine runs nearly east and west and lies 100 feet higher on Sherman Mountain. It dips northerly 45° in the upper levels and rather more below. The vein is about 18 inches thick on an average, showing, however, at the bottom of the interior shaft, two feet of ore. It is opened with a drift tunnel 185 feet long; a shaft 45 feet deep, located at the tunnel mouth and another of equal depth sunk from the tunnel at a distance of 75 feet from the former. These two shafts are to be connected by a drift which now lacks but 8 feet of completion and has also been carried some distance beyond the second shaft. The ore contains rather more galena than the Pelican, but does not run quite so high in silver, though both first and second class are rich, the latter not falling lower than 150 ounces to the ton. These figures, however, (which I give merely as my rough estimate,) do not comprise all the ore. There is doubtless a great deal running as high as 50 ounces, which hereafter in some way can be treated at a profit. The same is true of a very large amount of Pelican ore. The Maine has produced, I believe, altogether something less than $100,000. The present proprietors, (the mine has been sold to Messrs. GLENN & MARSHALL,) are at present principally occupied in opening ground for more extensive operations.

The Saco is a new mine opened lately on Leavenworth Mountain, a little below the Equator. It furnishes very rich ores and is said to have yielded $20,000 in less than a month.

The old Equator has been mainly worked by tributers and has furnished a large quantity of ore. So have the Terrible, the Snow Drift, Silver Plume, and several mines in Argentine district of which the Stevens, International and Belmont are the most prominent. The latter mine is situated still higher on the mountain than the Stevens, which is opened at an altitude of over 13,000 feet. The ground must be thawed in the workings every night by a fire—a novel application of the old Rammelsberg and Swedish "*Feuersetzen*," though they are already 300 feet from the surface.

In my next I shall have to say a few words about Mr. STEWART'S new amalgamating works, and those of Messrs. JUDD & CROSBY, the former just fairly started again, and the latter to be ready for work by the first of September.

A. EILERS.

GEORGETOWN, Colorado, Aug. 10, 1872.

MINING SUMMARY.

Nevada.

WHITE PINE DISTRICT.

We extract the following items from a correspondence in the *Mining and Scientific Press* of Aug. 10.

Next above the Original Hidden Treasure, is the

NOONDAY,

located on "Bromide Flat," about 1,000 feet west of the North Aurora. Has its main shaft down about 120 feet; at this depth a large body of low grade ore was found. A drift in the easterly direction from the ore chamber at the bottom of this shaft, has been run 200 feet; low grade ore appears throughout its entire length. This mine is situated on one of the "transverse breaks" of the hill. The drift above mentioned is run on the south line of the break. Two shifts of men are now engaged in driving a cross-cut through the ledge to the north. Several men are also engaged in the surface works of the mine from which good ore is being extracted. The mine promises well for the future; 7 men regularly employed. This is an incorporation with a capital of $2,000,000, in 20,000 shares.

WARD BEECHER CONS. M. & M. CO.

This Company is an incorporation with a capital

stock of $2,400,000, in 24,000 shares. Their claims are located on Treasure Hill, adjoining the Eberhardt and Aurora S. M. Co.'s property on the north, and south of the Anderson claim. Their improvements and developments consist of a vertical shaft 116 feet deep, (known as the north shaft;) one drift west, 90 feet to the ledge and a drift north along the wall, 90 feet in ore; hoisting by whim; a tunnel 300 feet long extends to this shaft. Their south shaft is down 50 feet vertically to the foot wall, which dips to the east at an angle of about 38°; breasting out from that point east; now in from foot of incline 80 feet in ore. Two other shafts are sunk upon this mine between the north and south shafts, to a depth of 112 and 65 feet. Ore is struck in both and improving; working 65 men night and day. The mill known as the Manhattan, located 1½ miles north of Hamilton, is the property of this company, and is kept constantly at work on the ores of the Ward Beecher Cons. M. & M. Co.'s mines. The mill has 24 stamps, with 8 large settlers, 16 pans and all the improvements necessary to run a mill of such capacity; run by a steam engine of 65 horse power; it has four boilers, and has a capacity of reducing 30 tons every 24 hours; not fairly under way at this writing; working 16 men; Dr. E. S. Gabb is superintendent of the mill. Every convenience, including a pay office, boarding house, etc., with out-buildings, is attached. Average assay of this company's rock for the last 20 days was about $45 per ton.

THE MUKWANAGO MINING CO

situated on Treasure Hill, White Pine, have secured United States Patents to the "Golden" and "Mount Vernon" fissure veins. Their patents extend from the North Aurora east line across the Hill. These surveys are together 600 feet north and south, by 800 feet east and west, and cross two important chambers of ore, crossing the Hill at right angles. The Mount Vernon vein fissure can be easily traced from the Aurora ore chamber] to the summit of the hill, and at all points where it has been explored, good ore is found. The Golden fissure line is in every respect similar in character to the Mount Vernon.

All the ore chambers on Treasure Hill have an underlie to the east, and the North Aurora must in time be worked through the patent survey of the Mukwanago Co's. mines.

SOUTH AURORA MINE.

The South Aurora mine is located at the south end of the crest of Treasure Hill, between the North Aurora and Eberhardt mines, and is incorporated in England and owned by the South Aurora Silver Mining Company (Limited;) 60,000 shares of $5 each. The claim, or mine, is secured by a United States patent which covers 800 feet in length, measured in a north and south direction along the course of the ore deposits, by 300 feet in width. This Company also own 400 feet of the South Iceberg, the North Snow-Drop and Genesee, adjoining the South Aurora on the west.

Products of mine to date, July 17th, 1872.—Ore extracted and milled, 23,000 tons. Bullion produced, $820,000.

DEAD WORK,—Over 4,000 feet of shafts, tunnels, winzes, etc., and costing from $65,000 to $75,000.

Most of the ore was taken from surface openings extending down to about 100 feet, below which there has been but little ore found.

The lowest level in this mine is called the Satterthwaite tunnel; the excavation including the tunnel, side or cross drifts and shafts sunk below this level, aggregate 1,120 feet, all in limestone.

From this level the company are now commencing to prospect with the diamond drill. And there are now sunk three holes respectively 100, 105 and 106 feet deep. Expect to reach a depth of 600 to 700 feet from this point or near 1,000 feet from the surface. Much delay and disappointment has been occasioned by a failure on the part of the agents of the Diamond Drill Company to furnish drill rods.

THE STANFORD MILL

is owned by this company, and is one of the best in that part of the State. It contains a rock breaker, thirty stamps weighing 750 pounds each, sixteen amalgamating pans, eight separators and four agitators, four retorts and two furnaces for smelting bullion.

The driving power is a steam engine twenty inches diameter of cylinder by thirty-six inches thick, to which steam is supplied by three boilers, each sixteen feet long, fifty-two inches in diameter, with fifty-one three-inch tubes, consuming six cords of wood per day. The capacity of the mill is from fifty to sixty tons daily. Located at Eberhardt about two and one quarter miles from mine. In the working of the South Aurora mine no unnecessary labor has been performed either in the mine, or on the surface. Officers of this company are: President, E. Satterthwaite; Secretary, Chas. Cadogan. Office, 54 Old Broad street, London, England.

Bullion produced by the South Aurora mine since being purchased by the South Aurora Silver Mining Company of London, England, up to July 1st 1872, $371, 514.20; expenditure including all dead work, $307,109. 30; balance $64, 404. 60.

THE SAN JUAN DEL RIO MINING COMPANY.

This company own three ledges, the San Juan Del Rio, the Rio Janeiro and the Castro; they own 1,000 feet on each ledge; the mines are located on the south spur of Treasure Hill, or Mahogany Canyon; a high grade of ore is found in the San Juan Del Rio, which gives indications of being a fissure vein. The incline sunk on the ledge is 55 feet deep and the ore body increasing, The company proposes sinking a 100 feet before stoping; there is 70 tons of ore out, working 6 men; sinking by contract. Incorporated with capital stock of $4,800,000 in 48,000 shares.

HAMILTON MILL & MINING CO.

Mines situated on Treasure Hill, mill and property situated in Hamilton, White Pine county. Capital stock 5,000,000.

THE POGONIP MINE.

Was located January 4th, 1868. It is situated on Pleasant belt, now known as the Pogonip Flat, on Treasure Hill, about 1,000 yards southwest from the South Aurora mine. It runs 800 feet north and 800 feet south, with three shafts varying from 40 to 60 feet in depth, and tunnel running northeast 30 feet, with open cuts and inclines; $40 to $60 ore in sight, in both shaft and tunnel.

THE OTHELLO MINE.

Adjoining the Pogonip on the southwest, located December 14th, 1868, running 400 feet each way from point of location, with shafts and open work done. Ore dipping northeast, and good ore in sight.

CHARTER OAK MINE.

Situated about 300 yards northeast from the O. H. Treasure mines, east side Treasure Hill. Located July 13th, 1868; running 600 feet northerly, and 600 feet southerly, with shaft 47 feet in depth, and tunnel 900 feet running southwest; $35 and $50 rock in sight. Working from 8 to 12 men.

THE MILL AND OFFICE

Are on Mill street, Hamilton. The mill, which crushes dry, has 10 stamps, new and complete, with all the late improvements of pulp conveyors, elevators, etc. There are six pans, three settlers, one agitator and retort. The engine is 75 horse power. The mill is centrally located. The spring from which the supply of water is had, is 500 yards northeast of the mill.

Arizona.

The San Francisco *Bulletin* of Aug. 10, has the following articles on the Diamond discoveries in Arizona.

JANIN'S REPORT.

The excitement about the diamond fields of Arizona has somewhat abated, and the efforts to conceal their precise location have not been abandoned. It will probably be discovered. The "Honest Miner" will hunt for the fields and no attempt to monopolize them will prove successful. In other countries slaves working for diamonds, are divested of all clothing, and promised their liberty upon finding one of the gems above a certain fixed value. Notwithstanding all these precautions the slaves will steal them. If diamonds exist in Arizona, as reported, thousands of people will go there to hunt for and secure them, and even now expeditions are organizing here and in other places for that purpose.

A PRELIMINARY REPORT.

HENRY JANIN'S report to S. L. M. BARLOW, gives the following information concerning his discoveries and work:

He says while at the diamond fields, there was washed of rich gravel less than, but say, three thousand pounds, or one and a half tons. This amount of work was done by Messrs. STACK & ARNOLD, principally, the only experienced washers, assisted at times by myself and other members of the party. The total amount of work done was under, but say four days' work of two men, or eight days' work of one man.

This amount of labor produced 256 carats of diamonds, first quality, worth $16 per carat, or $4.096; 568 carats diamonds, second quality, worth $3 per carat, $1,704; 824 carats, $5,800. Further, of rubies, four pounds, or 7,200 carats, worth fifty cents per carat, but estimated at thirty cents—$2,226. Total produce of one and a half tons of gravel, $8,026, or $5,350—say $5,000—per ton.

The estimate was made on a conservative, commercial and selling basis, and ignored the fact that while none of the diamonds were worth less, many were large enough to be worth much more per carat than $16. The estimate upon the rubies was made with due regard to the great quantity in which they can be produced and to the effect of this quantity upon the market.

The washing was done by hand, in ordinary gold pans. With the assistance of even the simplest machinery (gold rockers), the results of the same quality of gravel would have been increased many fold by the same number of days work. One thousand tons of such gravel as this would produce $50 per share, and would more than cover the purchase price and expenses of production. Gravel so poor as to produce in value only one per cent. of the ascertained value of the richest gravel would still be worth $50 per ton, and would pay very large profits, if washed in quantities. The expense of washing would never exceed $10 per ton. An acre of ground covers 43,560 square feet, and with an average depth of soil of one foot would produce (at twenty cubic feet per ton) over, but say two thousand tons. Therefore, if the ground proves as rich over only one-half acre of ground, as the stuff washed already, this small area will produce 1,000 tons, and would more than cover by its yield of diamonds and rubies the purchase money.

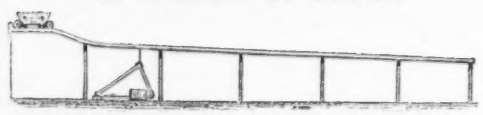
If ten acres only, which would furnish 20,000 tons, prove to be one-twentieth (five per cent.) as rich as the best ground, the produce will amount to $5,000,000, or $50 per share.

Our stay at the diamond fields was so short (we were in camp at the field only seven days) and there was so much to be done in the way of locating, surveying and securing the property, water-rights and timber lands, that it left much less time than I desired, in which to prospect and sample this tract of ground. To prospect the whole tract of nearly 3,000 acres would occupy months. I had only time to gather samples from those portions of the 160-acre block of ground which are marked on the accompanying plat. At each one of the points numbered, diamonds or rubies were found, as per enclosed samples. Those points were over one-third of a mile distant from the original discovery, and show a very large area to be diamond and ruby bearing.

The samples were taken from the surface. It is probable that at a greater depth larger diamonds would be found. The amount of prospecting done was insignificant, and does not enable me to form a judgment as to the extent or limits either of the very rich or only moderately rich ground.

The apprehension that diamonds may be found in such an abundance as to destroy their value, is, to my mind entirely without foundation. The question of water is satisfactorily answered by the statement that we secured five streams, being all we found on this side of the mountain. The Arnold creek alone (and two of the others are much larger) will suffice for all demands for power and washing for any amount of machinery and any number of tons of daily washing of gravel. We secured also 320 acres of pine timber land, ample for all time for fencing and for flumes and buildings—steam-power will never be necessary. The streams of water are so situated that they can be carried to any part of the property at a moderate expense. A mining district was formed and mining laws passed to protect our interests. In conclusion, I would say that I consider this a wonderfully rich discovery, and one that will prove extremely profitable. That while I did not have time enough to make the investigations which would have answered very important questions, I do not doubt that further prospecting will result in finding diamonds over a greater area than is as yet proved to be diamond-bearing; and finally, that I consider any investment at $40 per share, or at the rate of $4,000,000 for the whole property a safe and attractive one.

60 Tons Per Hour.



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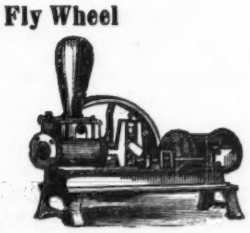

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MISCELLANEOUS.

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Calculated in accordance with the Official Tariffs published by the United Royal Smelting Works of Clausthal (Harz), Freiberg (Saxony), and Eisleben (Mansfeld).

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10	$ 4 60	1-10	$ 1 60	15	$ 1 60	1	$ 1 15
20	16 20	5-10	8 90	20	3 95	5	8 05
30	28 90	1	17 80	25	7 10	10	19 60
40	40 45	1½	27 05	30	11 10	15	31 85
50	52 05	2	36 60	35	14 15	20	45 45
60	63 80	3	55 20	40	17 25	25	58 80
70	76 60	4	73 35	45	20 20	30	72 00
80	87 90	5	92 10	50	23 50	40	96 20
90	100 60	6	111 40	55	26 30	50	127 35
100	111 70	7	129 80	60	29 50	60	155 70
110	124 40	8	148 15	65	32 85	70	185 00
120	137 20	9	168 30	70	36 30	And so on.	
130	148 55	10	186 80	75	39 50		
140	161 10	11	205 30	80	42 85		
150	173 60	12	225 45	85	46 25		
175	205 10	13	244 10	And so on.			
200	234 45	14	263 30				
225	265 85	15	283 85				
250	297 35	20	379 90				
275	329 70	And so on.					
300	361 50						
350	424 20						
400	486 25						
450	549 50						
500	613 75						
And so on.							

NOTE.—In the Original Tariffs the ton of ore is equal to 20 cwt. = 2240 lbs. English, whilst in these tariffs only 2000 lbs. avoirdupois are taken to the ton—thus 291,63 ounces troy of silver or gold in the ton are equal to 1 per cent. For silver contents above 1 per cent. (300 ounces in the ton of 2000 lbs.), generally 2 per cent. are paid in addition to the tariff prices.

The tariffs for Lead and Copper are based upon an average price of 5½ thalers for 100 German pounds (about 8½ cts. gold per lb. English) for Lead, and of 45 thalers for 100 German pounds (about 16¼ cts. gold per lb. English) for Copper; in case the actual prices are higher, the difference is paid extra. At the present time (August), for instance, $71 coin are paid in addition to the tariff prices for 2000 lbs. of Copper; and $13 coin in addition to the tariff prices for 2000 lbs of Lead.

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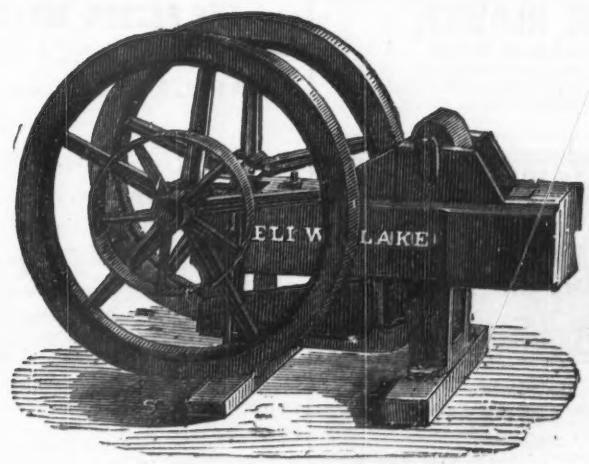

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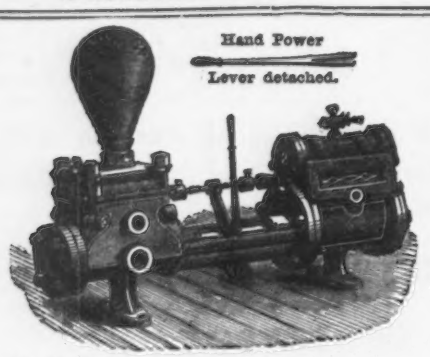

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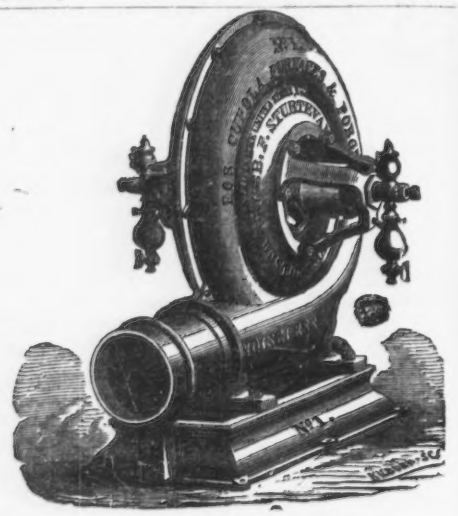

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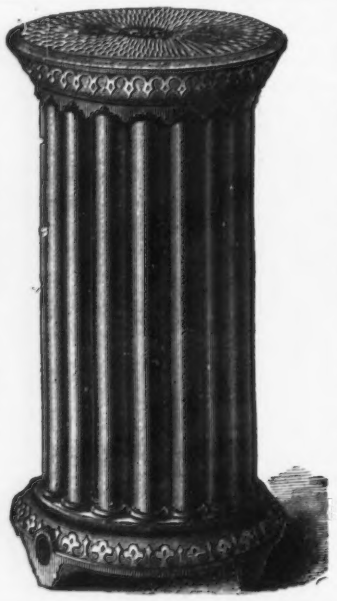

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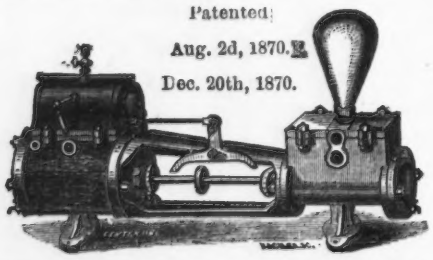

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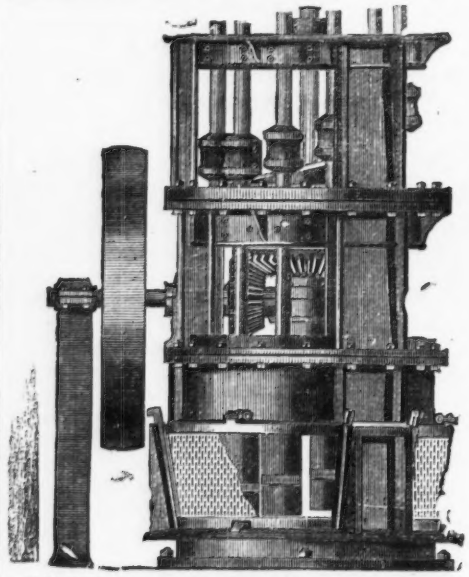

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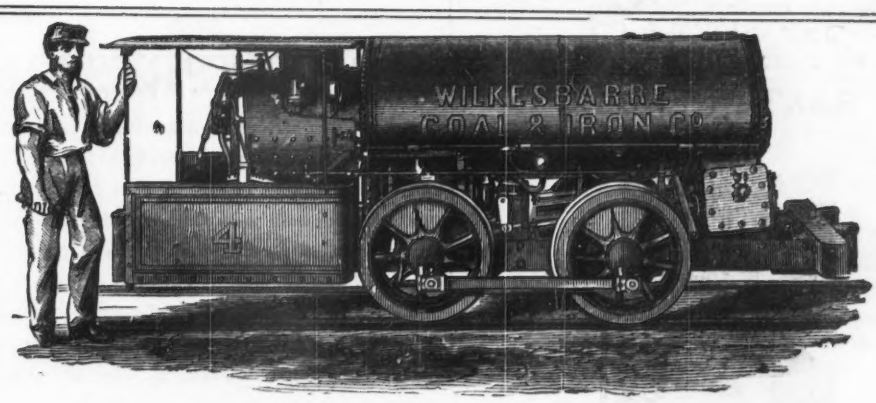

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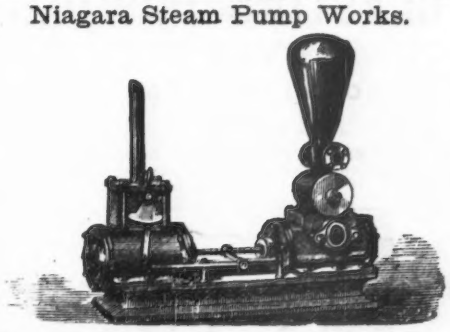

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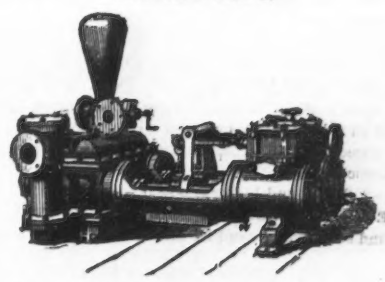

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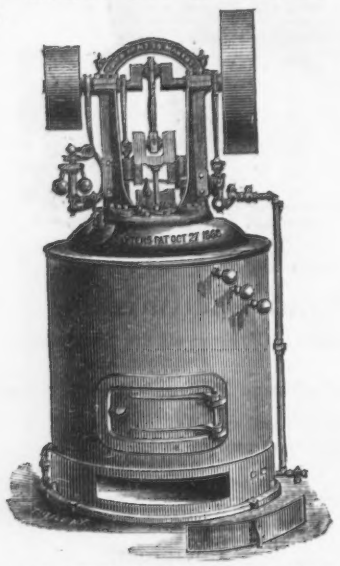

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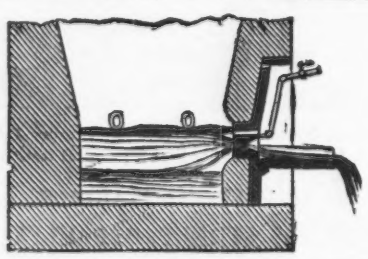

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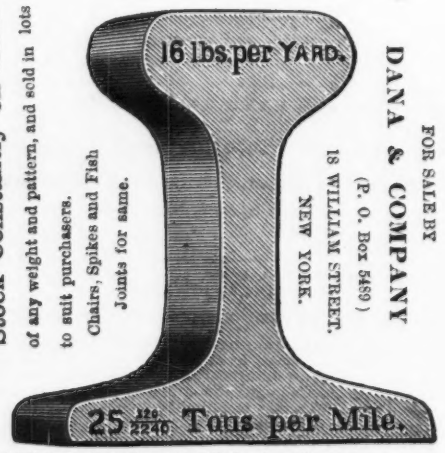

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